LECTURE NOTES
IN PHYSICAL DIAGNOSIS AND LIFE INSURANCE

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LECTURE NOTES

...IN...

PHYSICAL DIAGNOSIS

...AND...

LIFE INSURANCE

...BY...

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PREFACE.

The object of the compiler of these notes was to furnish to the medical student the practical points in physical examination, in such a way and form as would readily catch his attention, thus making it more easily acquired.

At the same time to make them sufficiently full, so as to be equally serviceable after leaving college. It was with a conviction of its necessity, founded upon several years' experience in teaching the subject, that it was undertaken.

How far it will answer the purposed end will be best known after making use of it.

The method adopted was to follow out in certain order, in detail, the consideration of the examination, laying special stress upon the proofs and evidences of normal conditions first, then considering signs and symptoms of disease, causes, etc.

The student has here given him what he should notice at present, instead of what he might want at a more advanced period of life, something that is immediately useful and important, that in which unless he is thoroughly grounded he must be seriously handicapped in practical medicine.

There are no references given nor authorities cited, but the works of many authors have been consulted. Acknowledgment is here made of indebtedness to them, as it was impossible to do so in the text.

G. H. S.

LECTURE NOTES IN PHYSICAL DIAGNOSIS.

The subject embraces more and less than is embraced in a translation of the terms, Physical and Diagnosis.

Physical is derived from the Greek Phusis, meaning nature, character, constitution.

Diagnosis, from the Greek Diaginosko, meaning to know fully, to discern, to determine.

Physical Diagnosis, properly defined as used in medicine, means a thorough discernment of the human constitution.

In our teaching, however, we limit it and thus define it.

Physical Diagnosis is the determination of the structure and functional condition of all the organs of an individual from the signs which are revealed by Inspection, Palpation, Percussion, Auscultation and Mensuration, and also the causes of such conditions as have resulted from disease, or causes which tend to produce disease.

The Value of any Physical Diagnosis depends upon a knowledge of normal types.

He who knows the normal best is the best diagnostician.

It is a very grave mistake to try to learn to know pathological, rather than physiological, conditions.

The Normal must be known before the abnormal can be thoroughly understood.

THE NORMAL.

In human nature, as in all animal life, the normal is not abstract, but relative.

It consists of certain relations of the parts to each other and to the whole.

For instance, the organs of the infant are as normal as those of the adult, if they bear infantile relations to each other and to the whole economy.

If, however, they bear adult relations and are the same in structure and functional condition as those of the adult, they are abnormal.

The relation of age, height, weight and form must always be kept in mind in the study of the normal.

THE ABNORMAL.

If it were only true that with every abnormal condition there were some individual marks which were always found with it and no other, diagnosis would be considerably easier than it is. As it is, the knowledge obtained by *Inspection, Palpation, Percussion, Auscultation* and *Mensuration* pertains to physical conditions only, and these may belong to several abnormal conditions, for instance, in a given case:

Inspection reveals restricted movement.

Palpation, increased vocal fremitus.

Percussion reveals dullness.

Auscultation shows a prolonged Expiration, with higher pitch than Inspiration, a pause between Inspiration and Expiration, vocal resonance increased.

These would indicate in combination some solidification of the lung.

But from them we get no information as to the causes which produce it.

We must reason that from the presence or absence of other physical signs and from the knowledge of the History and Symptoms of the Patient.

Knowledge of the History and Symptoms of the Patient and present condition is desired in two ways:

1. *Inquiry of the patient or friends.*
2. *Personal examination.*

The History is of much importance and it requires much tact and skill to get an accurate history from many patients.

You will not have much difficulty in getting the Symptoms, but the *History* is likely to be shaded or covered with misstatements from start to finish, and it requires the art of the legal cross-examiner oftentimes to get the true History.

Frequently the information is voluminous and but little of which can be accepted.

Again it is so scanty that everything must be inferred.

Thus it requires in all cases some penetration to arrive at a fair conclusion.

In making all inquiries remember:

1. To avoid asking leading questions—i. e., such as will influence the reply by the manner in which they are made.
2. Do not accept without inquiry the names of diseases which the patient speaks about, but learn the symptoms and course of them.
3. Discover simulation. There are many reasons why diseases are simulated.
4. Suspect concealment of disease.

In your work it is of the utmost importance, if you are to be systematic, thorough and rapid, to not only follow a regular form and order, but also to make a record of it.

It enables one always to recall the treatment and to obtain an exact knowledge of the value of certain lines of treatment, or of the action of certain drugs.

It increases the confidence of the patient if you can inquire concerning certain important symptoms of which he has previously complained.

It establishes proof of improvement or the advancement of the disease.

The Library System of Recording possesses very many advantages, and arranged as follows is inexpensive:

A printer will cut you five hundred cards, size 4x4½, from white cardboard, such stock as you can use ink upon. A tinner will cut you twenty-six pieces of tin, 4½x5. Letter them A, B, C, etc.

A box of suitable size, or better, a drawer of your desk, will answer for filing them, and you are ready to begin.

When a record is made place the card under the proper initial and it can be referred to in a moment, always writing the name at the upper left-hand corner.

Next take a blank card and write the following form upon it. Then when you make a record of any case place it before you and follow it until it has become so fixed in your memory that you can follow it without looking at it. If you wish to make a record away from your office, get the points of the case on a ℞ blank and arrange them on the card when you return to the office, thus:

Name. *Age.* *Nativity.* *Residence.* *Date.*

Family History
- 1. *Health of parents. brothers, sisters and children.*
- 2. *Age*, if living.
- 3. *Causes of and ages* at death.
- 4. *Family traits* respecting disease on both mother's and father's side.

Personal History
- 1. *Heredity*, resemblance of father and mother and same afflictions, if any.
- 2. *Habits*, mode of living, social condition, use of liquors, tobacco, tea and coffee.
- 3. *Occupation*, changes of occupation, if any, and when.
- 4. *Diseases* experienced.

Present Condition
- 1.
  - *a*. *Mental* and physical condition.
  - *b*. *Posture*, gait and expression.
  - *c*. *Skin and subcutaneous* cellular tissue.
  - *d*. *Pulse, respiration, temperature, weight and height.*
- 2. How the various functions of the body are performed.
- 3. Examination of special organs.
- 4.
  - *a*. Nature of the disease and duration.
  - *b*. What effect upon the individual as a whole.
  - *c*. Progress and peculiarity.
  - *d*. Prognosis, treatment.

It is important that we know something of the conditions which existed in the parents.

Parents transmit facial expression, figure, color of hair, eyes, mental traits, and it is very probable, if not actually diseased organs, yet a condition which is necessary to the development of like diseases. For this reason we especially inquire after:

1. Brothers, sisters, uncles, aunts and even grandparents, wife or husband. Many diseases are transmitted from wife to husband and vice versa.
2. Age of these, if living. A long-lived parent is likely to beget long-lived offspring.
3. Causes of and ages at death. A number dying early in life is always suspicious, unless from infectious diseases.

4. A history of gout, rheumatism, cancer, insanity, Bright's disease, syphilis or nervous diseases, in the ancestry should induce a careful inquiry for the same in the offspring.

PERSONAL HISTORY.

1. What conditions, if any, have been inherited, and also appear in other members of the family.

2. *Habits,* harmful things which they have undergone, residence in healthy districts. Have they children? If a woman, character and number of confinements. Diet, clothing, manner of living. The use of alcohol, tobacco and other narcotics; its amount and probable effect.

3. *Occupation* frequently marks the whole economy, and is often the predisposing or exciting cause of disease.

It may have a good or bad influence upon many chronic diseases.

Whether exposed to sudden changes of heat and cold, wet and dry, or to unsanitary surroundings; workers in mills and dusty factories, in certain metals, lead type, typesetters, painting, bronzing and gilding.

4. *Diseases Experienced,* both acute and chronic.

Certain acute diseases have their sequelæ, which must be looked for, as paralysis following diphtheria, nephritis following scarlatina.

Certain diseases usually occur but once, as scarlet fever, measles, typhoid fever.

Certain also repeatedly occur, and having had once are more likely to have again and again, as tonsilitis, erysipelas, pneumonia, pleurisy, rheumatism.

The diseases spoken of as children's diseases, as a rule, have no great importance; exceptions, measles and whooping

cough, which lay the foundation for many cases of tuberculosis and should be carefully inquired about.

PRESENT CONDITION.

(a) *Mental Condition.*

Observe the grade of intelligence, ability to think, effect of surroundings, depression, irritability, exhilaration.

Physical Condition.

Large, firm bones, broad shoulders, erect posture, usually mean healthy, strong and long-lived individuals.

The delicate, small-boned, slender- ribbed, narrow-chested is very apt to be short-lived.

The condition of the muscles gives us some idea of the nutrition. Observe their activity or restraint.

The fat of the body is very differently deposited, even in persons of good health.

A marked leanness or fatness is, under all circumstances, suspicious.

Loose adipose tissue usually means a weakened organization.

(b) *Posture, Gait and Expression.*

Patients who are in bed and very sick usually slide to the middle.

In acute infectious diseases, combined with muscular weakness and a clouded brain, the natural position is upon the back. Persons with pneumonia and pleurisy frequently are found lying upon the affected side, as it lessens the pain by limiting the motion.

Pulmonary engorgement and œdema, emphysema or asthma usually cause the person to assume the upright sitting posture, as they can better use the accessory muscles of respiration.

Diseases of the brain cause the so-called contraction of the neck, or drawing of the head persistently to one side.

We may have a forcible drawing of the head to one side from a spasm of the muscles of the neck.

Observe anything which limits chest expansion, distorts the features or displaces the viscera.

Gait.

If the patient is an ambulatory one, see if gait is shuffling, dragging, stooped, or in any way peculiar.

Expression.

Careful inspection should always be made of the expression.

Observe the general appearance of the face and shape of the head.

Distinguish between the weather-beaten face and the flushed, heavy, expressionless face of alcoholism.

The color of the face may be reddened, grayish or bluish from certain drugs.

The expression of anxiety in certain grave diseases.

The coarse and heavy face of long-suffered pain.

The yellow, straw-colored face and anxious look of malignant diseases.

In childhood especially the expression is full of information. If asleep and healthy the eyelids are closed, lips slightly parted, nostrils at rest and countenance peaceful.

If nervous and digestive trouble with pain is present the eyes will be slightly parted as a rule.

In indigestion or fever there is a disturbed and sighing respiration.

In pneumonia or pleurisy (early stages) child coughs, then cries.

In stomatitis, it takes the breast eagerly and drops it sud-

denly. If it drops it with a gasp, then something interferes with respiration, likely a coryza or rhinitis.

Twitching of the eyelids often precede the convulsion.

Jadelot's furrows should be noted. Pain produces a pinched look about the eyes, nose and mouth.

Pain in the head, the forehead is apt to be in a frown.

Pain in the chest, the nose is likely drawn and thin.

Pain in the belly, the upper lip is raised.

The flaxen-haired, slimly-built child, with transparent skin, temporal veins prominent, thoughtful face and deep in expression is very apt to be a victim of tuberculosis.

The cheesy, heavy-looking face, apparently solid and sturdy, features thick and coarse, with short neck, is frequently subject to tubercular bone disease.

The facial expression of the mouth-breather, with pointed maxillæ and teeth crowded out, is marked.

In the adult, with acute phthisis, the quivering nostril, red flush upon the cheek, the eager glancing eye.

With pneumonia, the flushed face, deeper red on one side than the other, the anxious expression and dilating nostrils.

The facial expression of acute and tubercular peritonitis and typhoid fever is very marked.

Acute and chronic kidney disease produces generally a pale, worn, weary and puffy face.

The Cretin is marked with broad nose and flat, thick lips, tongue enlarged and waxy skin.

The massive features of the myœdematous patient almost opens our eyes to a diagnosis.

Constitutional syphilis produces the so-called saddle-nose.

Swelling and redness of the nose is present in inflammatory processes of the nasal mucus membrane, as well as in the inflammatory skin diseases of the organ.

(c) *Skin and Subcutaneous Cellular Tissue.*

Observe whether loose and flabby, easily taken in folds.

Color.

Pale. Indicating either anæmia, disturbance of circulation, hemorrhage, tuberculosis, septic conditions, chronic diseases of the digestive tract, chronic nephritis, tumors, etc.

Red. Indicating dilatation of capillaries, use of certain drugs, disturbance of respiration and circulation through the lungs, cold, heat, action of sun, disorders of digestive tract, interference with the oxygenating process of the blood.

Yellow. Indicating absorption of bile, first seen upon the forehead, and sclerotic, not discovered by artificial light.

Brown. Addison's disease.

Gray. Long-continued administration of silver nitrate.

Mottled Skin. Increased and diminished pigmentation, seen frequently upon hands, face and trunk, called vitiligo, or leucoderma.

Eruptions.

Skin lesions bear a peculiar relation to age. *Infancy, Adolescence, Puberty* and *Senility* all possess charms for certain eruptions.

Oedema. Most manifest in dependent parts, as at the ankle and dorsum of foot in persons moving about.

Those in bed, it is found on the inner side of the thigh, scrotum in the male, upon the lower part of the back, on the face, in the eyelids.

Oedema in extremities likely cause—Heart.

In the Face—Kidneys.

In the Abdomen—Liver.

Oedema of the Feet is one of the terminal effects of phthisis.

(d) *Pulse—Respiration, Temp., Weight and Height.*

The pulse reveals more and more as we carefully study it.

We study the pulse at the radial arteries, excepting in the aged, in whom the pulse varies greatly at the radial and the heart's action can only be determined by listening to it directly.

In feeling the pulse have the arm of the patient in an easy, unrestrained position, and determine:

1. *The condition of the artery itself*—i. e., whether soft and elastic or hard and atheromatous.
2. *The quantity* of blood passing through it.
3. *The force of the* blood current, as determined by the contraction and dilatation of the vessel.
4. *The frequency* of the impulse.
5. *The rhythm* of the impulse.
6. *The quality* of the impulse.

The Frequency.

A number of conditions in health influence the frequency.

Age. Newborn, 140; adolescence, 80-100; adult, 72-78; senility, 76-82.

Sex. Female, 2-6 beats more than male.

Size. Small persons more frequent than large.

Time of Day. Slowest in morn, fastest toward evening; difference, 10-20 beats.

Position. Slowest in lying down, fastest in standing; difference, 8-12 beats.

Meals, Food, etc., increase the pulse rate for one or two hours.

Heat and Cold. The lower the temperature externally the faster the pulse.

Muscular Activity increases, also deep respirations, hence the heart should be examined first in such cases as require heart examination.

Mental Conditions, produced by fright, joy, etc., quicken the pulse.

Conditions in Diseases causing increased pulse rate:

1. *Fevers.*

   As a rule the amount of increase depends

   1. Upon the character and location of the fever.
   2. Age and physical condition of patient.

   Typhoid fever quickens pulse rate moderately.

   Acute miliary tuberculosis, pyæmia and pneumonia have much greater frequency.

   The frequency of a typhoid pulse approaching the rate in tuberculosis or pneumonia increases the gravity and points to some complication.

   A fever in a person having heart diseases usually produces a more rapid pulse than in those whose hearts are normal.

   The pulse of the child is more rapid proportionately in high temperature than the adult.

   A pulse of 140 and over in the adult is a grave condition.

   An increase of pulse rate with a steady or falling temperature is a most important sign of a failing heart.

2. *Mitral Obstruction and Aortic Insufficiency.*

   These heart lesions usually increase the rate. Even with complete compensation in mitral obstruction we may have a pulse rate of 150 and over.

3. *In heart failure* or paralysis.
4. *Exophthalmia* and certain nervous diseases.
5. *Severe Pain* and anxiety.

In all pulse rates over 100, if heart disease and acute fevers are excluded, suspect tuberculosis.

Conditions Producing Slow Pulse.

1. *Fatty Degeneration* of Heart Muscle. Most marked just before fatal issue.
2. *Aortic Stenosis* usually produces a diminished frequency.
3. *Diseases of the Brain* or its coverings.
4. In the decline of acute fevers and during a hemorrhage occurring in acute fevers.
5. *In Individual Cases* of jaundice, acute articular rheumatism, disorders of the blood.

The Rhythm.

The rhythm of the healthy heart, as shown by the sphygmochronograph, has a marked variation, which is not well understood.

By palpation we practically find at rest and quiet a regular rhythm, which the heart endeavors to conserve.

Even decided disturbance of the valvular apparatus of the heart produces no effect usually upon its regularity.

Disease of the muscle or nervous apparatus being necessary to produce arythmia.

The weakness of the heart is shown much more by the inequality than by the irregularity of the pulse.

Mitral stenosis, when complicated with disease of the muscle, produces a marked irregularity.

Myocarditis is generally attended with an irregular pulse. This may be the only sign of its presence.

A Suspended Pulse is one in which there are individual pauses.

It may result either from a lack of cardiac contraction or from the contraction being so weak that its force is not felt as far as the radial.

Which it is can be determined by auscultation.

The Type of Irregularity.

In severe heart weakness it is frequently two or three regular, then a small, weak pulsation, with a slight pause.

The Quality depends both upon the strength of the heart and the tension of the vessel wall.

Considerable practice and an acutely-feeling finger is necessary to judge of the *quality* of the pulse.

It may be

1. *Large,* as in cases of hypertrophy of left ventricle without valvular involvements.
2. *Small,* from any cause which permits but a moderate amount of blood to enter the aorta, as either an obstruction, a decreased action of the heart or a diminished amount of blood.
3. *Quick.* The artery enlarges and contracts quickly with short stroke, very marked in aortic insufficiency.
4. *Tardy.* The artery enlarges and contracts slowly, while the stroke is more like a steady pressure, as in arterial sclerosis, angina pectoris, renal diseases.
5. *Hard.* Not easily compressed, as in cerebral apoplexy, lead colic, contracted kidney, beginning *of* meningeal diseases, serous inflammations.
6. *Soft,* easily compressed, as in attacks of fainting, prostration, collapse.

The peculiarities of the pulse in different arteries.

The pulse should occur at the same time in similar arteries on different sides of the body, and should also be of same quality and volume it is changed in.

1. Abnormal distribution of vessels.
2. *Obliteration* by surgical or other means.

3. *Aneurisms.*
4. *Thrombosis and Embolism.*
5. *Pressure* from tumors.

RESPIRATION.

Frequency.

Infant, average	50
Child, 2-6	25
Puberty	18-20
Adult	14-18

Easily Influenced by

Position.
Mental and muscular activity.
Anxiety and mental impressions.

In taking the respiratory rate the patient should not be aware of it, as the desire to appear all right, or the psychical effect is very apt to influence the rate.

The respiratory rate can best be taken after taking the pulse.

After learning all you can about the pulse, fold the patient's arm upon the epigastrium, still retaining your hold upon the wrist. In this way you can readily determine the respiratory rate and the patient think you are taking only the pulse.

Inspiration is Muscular. Expiration Resilient.

Inspiratory Dyspnoea is caused by anything hindering the free ingress of air into the lung, occurs in

Œdema of the glottis.
Spasm of the glottis.
Paralysis of the vocal cords.
Pressure from tumors or aneurism upon trachea.
Paralysis of muscles of inspiration.

Expiratory Dyspnoea is caused by anything diminishing the elasticity of the lung or preventing exit of air. Occurs in

Bronchitis.

Emphysema.

Tumors below vocal cords.

Bronchial asthma.

Respiration should be generally regular, though in health frequently we find it irregular, especially in sleep.

Cheyne-Stokes Respiration is the most marked deviation in the regularity of respiration, beginning with a number of rapid respirations, then diminishing until the respirations are very deep and prolonged, often approaching dyspnœa, then returning to the beginning rapid respiration.

Many explanations are given, but nothing known of the exact cause.

It does not always indicate grave conditions.

Occurs in health occasionally during deep sleep.

When produced by drugs it denotes serious, depressing and poisonous effects.

When chronic it is of the least importance.

In infectious diseases recovery frequently takes place.

In cerebral, renal and cardiac affections it is always a grave symptom and usually indicates an approaching fatality.

TEMPERATURE.

Record the temperature of every patient, for no serious pathological process can be present for any length of time without manifesting itself by the temperature course.

Buy only the best thermometers.

Whether temperature is taken in mouth, axilla or rectum always remember the possibility of any local inflammatory action producing local heat.

When taken in the axilla, always thoroughly dry the space, or the perspiration will prevent a correct index.

When taken in the mouth, one hour at least must have elapsed since the last food or drink of any kind has been taken, and for ten minutes previous to inserting the thermometer the mouth must have been completely closed.

Senile temperature is distinctly below that of the child and adult.

Rectal temperature is about ½° higher than in the mouth.

The Temperature of the Body.

In health it varies through the day, fluctuating from 1.8° to 2.3° during twenty-four hours.

The lowest point between 2 and 6 a. m., the highest, 5-8 p. m.

In fever the temperature does not remain at one point, as in health.

Remissions and Intermissions of Fever.

Are noticed in the decline of acute disturbances.

Are especially likely to be found in:

Chronic syphilis.

Pulmonary phthisis.

Malaria.

The temperature of chronic tubercular disease of the lung sometimes even follows a quartan, tertian or quotidian type.

The Inverse Type. A high morning temperature and an evening remission may be found in rare cases of typhoid.

More frequently in chronic lung affections.

A high morning temperature usually points to an infectious disease.

Chronic diseases of the lungs not of an inflammatory or tubercular nature, also chronic heart diseases, are usually attended with a slightly subnormal temperature.

A daily morning subnormal temperature is peculiar to chronic pulmonary phthisis.

Excessive hemorrhage may be followed by low temperature, as low as 96 or 97.

A confinement case in my care, with but slight hemorrhage, the temperature remained at 96.5 for forty-eight hours after delivery, in which this was the only abnormal condition discoverable, and recovery was perfect.

A High Temperature with previous good health points to malaria.

Injuries to the cervical regions of spinal cord often, and also pathological conditions which press upon heat centers in the cord, produce high temperatures.

A sudden fall of high temperature means collapse or fatal issue.

A severe case of fever continued through a number of days points to typhoid.

Exclude intestinal intoxication and miliary tuberculosis.

In the latter the pulse rate is more rapid and in both the temperature is higher and not rising by gradual steps nor having a morning remission.

High Temperatures in children are frequently developed from slight causes, such as crying.

The older the patient the greater the importance of the change in temperature.

Duration, not degree, is of the most importance.

High temperature may be borne for a short time without bad results, but not so with a continued fever of less degree for some days.

The temperature of pneumonia rises rapidly and remains high.

Unless the patient is old do not call a fever pneumonia if it does not reach 102°.

The temperature of the newborn should not in health be above 100.5.

The temperature usually rises after death.

WEIGHT.

The weight of the body forms an excellent index of its condition, and especially so in its relation to stature.

The average height of the male is 5 feet 8 inches, and he should weigh 148 pounds.

For every inch more or less add or subtract 5 pounds.

The maximum and minimum, for health, is found by adding or subtracting 20 per cent from the standard, for example, 5 feet 6 inches standard should be 138 pounds, minimum limit 20 per cent less=110; maximum 20 per cent more=165.

The infant and the person under medical treatment should be weighed weekly.

Excessive weight is attended with a diminution of respiratory capacity. One cubic inch for every pound in weight.

HEIGHT.

A rapid loss of weight is in all cases suspicious.

Height also plays an important part in influencing the health.

There being an increase of 8 cubic inches in vital capacity for every inch in height between 5 and 6 feet, the tall person having a greater capacity than the short one, unless he is under such conditions as require the use of that capacity, he will have a lessened respiratory functional activity; this produces an impaired nutrition, which leads to many abnormal conditions; in other words, the tall person has a greater liability to chest diseases than the one of average height.

VARIOUS FUNCTIONS OF THE BODY.

Sleep, if disordered, is classified as:
Somnolence or unusual sleepiness.
Insomnia or lack of sleep.
Somnambulism, or partial sense suspension.

1. *Somnolence.*

Conditions leading to.

- Lethargic temperament.
- Extreme heat or cold.
- Gluttony.
- Excess of alcohol or fatty foods.
- Poorly ventilated rooms.
- Imperfect nutrition.
- Drugs.
- Disturbances of the brain.

A sudden and irresistible desire for sleep is frequently met with in:

- Obesity.
- Gout.
- Diabetes.
- In circulatory changes after hemorrhages.
- Violent emotion.
- Functional excesses.
- Epilepsy, etc.

2. *Insomnia.*

Causes.

- *Cerebral excitement.*
- *Chronic alcoholism.*
- *Insanity.*
- Ingestion of tea, coffee and certain drugs.
- Pain.
- Diseases of the heart.

Pregnancy.

Certain abnormal blood conditions.

3. *Somnambulism.*

Causes.

Mental emotion.

Overstudy.

Hereditary influences, especially of epilepsy.

DIGESTION.

Whether able to digest all or certain kinds of food.

Whether desire or disgust for food.

Unnatural craving or excessive amount.

Desire for liquids.

Unusual thirst is present in diabetes, in chronic gastric catarrh, especially at the close of the day; febrile diseases, diarrhœa, hemorrhage, persistent vomiting.

Learn the amount of water consumed daily.

Patients as a rule do not use water freely enough, either internally or externally.

The teeth should be carefully noted.

If wanting or decayed the food is not properly prepared for the stomach; it ferments, is decomposed and the products of decomposition poison the economy and produce a chain of evils.

The presence of decayed teeth in childhood frequently is the cause of enlarged cervical glands, and their presence at any time of life furnish a splendid nidus for the growth of tubercle bacilli.

TONGUE.

The appearance of the tongue aids us in forming an idea of how digestion is being carried on, as well as giving us in many cases important aids in our diagnosis.

A heavy-coated tongue in the morning may result from decayed teeth, follicular tonsilitis, unclean teeth, use of tobacco.

A dry, rough, brown, narrow tongue, with edges and tip red, tremulous, occurs in typhoid fever.

A broad, flabby tongue, with edges indentated by the teeth, occurs with chronic gastric catarrh.

A whitish, yellow, pasty tongue indicates an inactive liver.

A small, red-pointed tongue, with papillæ standing out, occurs in acute gastric catarrh.

A fissured, thickened, raw tongue occurs in intestinal indigestion, gout and chronic rheumatism.

A pale, livid—flabby, anæmia.

A dry, red, harsh, not coated—serious renal, hepatic or gastric disease.

A dry tongue in any severe disease is always a serious symptom.

The feeble minded constantly roll the tongue.

Paralysis of the tongue may follow diphtheria.

The strawberry tongue of scarlatina is characteristic unless modified by an existing dyspepsia.

Dilated veins at the base of the tongue, also lymphoid hypertrophy, cause many reflex symptoms, and it should always be examined for their presence.

Many of the skin diseases appear on the tongue and mucous membrane of the mouth, as eczema, impetigo, urticaria.

The buccal and labial mucous membrane often gives important information, as pigmentation in Addison's disease, cancer of the stomach, stomatitis, cirrhosis of the liver.

Presence of discrete and peculiar markings in measles.

Anaemia of the larynx. It is a very suspicious sign of incipient phthisis, at the same time being the cause of some troublesome forms of cough.

STOMACH.

Inquire concerning regularity and frequency of meals.

Is food bolted or washed down with fluids?

If pain or distress after meals. How long after and where?

Eructations of gas or food. Pyrosis, nausea or vomiting.

Distension of abdomen, rumbling in stomach or bowels.

Pain from intestinal indigestion extends during the whole day from one meal to another.

Pain from gastric indigestion ceases when food passes out of stomach.

BOWELS.

The regularity of the bowels should be known; also frequency, character of the passage, quantity, form, consistence, color and odor.

Inquire for the presence of enteralgia, intestinal colic, constipation, diarrhœa and bloody stools.

Remember that a person may go to stool every day and yet suffer from habitual constipation; hence the necessity of knowing about form and consistence.

Many cases of nervous depression, hypochondriasis, indigestion, anæmia, depend solely on habitual constipation as a cause.

Constipation in the child is the first effect noticed of insufficient nourishment.

KIDNEYS AND BLADDER.

Concerning the urine, inquire for the amount and frequency during day and night, pain, tenderness, uneasiness or burning along the urethra.

Conditions influenced by movement, position or occupation, as walking, riding, going down steps.

Is there pain or itching at the meatus after micturition?

Ability to retain the urine.

Character of the stream.

All malpositions of the bladder are relieved upon lying down.

Never leave a fever patient without a knowledge of the bladder.

Menstrual. If pain, when, where, how long existing?

Flow, free or scanty, duration, character, regular or irregular.

Organic disease of the kidney is a frequent cause of irregular menstruation.

EXAMINATION OF SPECIAL ORGANS.

LUNGS.

Before examining the special organs for diseased conditions, a knowledge of what the normal physical signs are is necessary, for if the normal is not known the abnormal will not be discerned, and as our signs are revealed by Inspection, Palpation, Percussion, Auscultation and Mensuration, we will study the normal under each of these headings.

INSPECTION OF THE LUNGS' ENCASEMENT.

The examination of the chest always begins with Inspection.

A large number of diseases of lungs and pleura are manifested by change in form of chest or in manner of respiration.

By its form it also causes or predisposes to certain diseases.

Inspection should begin with patient standing straight.

Head and chin straight forward.

Standing firm upon both heels.

The light evenly falling upon front or back.

There are many variations and departures from a symmetrical thorax, even in persons perfectly sound.

There should be, however, a striking resemblance to the following in every well-constructed thorax:

Anteriorly.

The depressions of the clavicle should be similar.

The angle of Louis discernible.

The nipple at the level of the fourth interspace.

From clavicle downward as far as the fourth rib the surface should be slightly convex.

The ribs should increase in obliquity from above downward.

The epigastric angle should be about a right angle.

The intercostal spaces should be invisible, except at the lower ribs.

Posteriorly.

The scapulæ should lie flat upon the thorax.

The dorsal vertebræ curve slightly toward the right.

The expansion on both sides should be about the same.

The lateral curves of the thorax should be similar.

The circumference of the thorax in quiet breathing, at the level of the third costal cartilage, should be about one-half the height of the individual.

The expansion, that is, the difference between forced inspiration and forced expiration, should be at least 1-10 of the circumference of the thorax.

In the female during inspiration the ribs and sternum are elevated, drawing the thorax upward and outward, termed costal respiration. *Exception.* Aged females incline to abdominal breathing.

In the male, during inspiration, the diaphragm contracts, the abdominal wall presses downward and outward, termed ab-

dominal respiration. *Exception.* Male children incline to costal respiration.

ABNORMALITIES OF THE CHEST.

An enlarged heart or effusion in the pericardial sac, pleura or enlargement of the liver, aneurisms, tumors, enlarged spleen may produce a local enlargement of the thorax. varying with the flexibility of the thoracic walls.

We must not conclude from the absence of a localized enlargement that there is no effusion.

There may be a drawing in or shrinking of one side after a long-continued pleuritic exudate, in which the lung does not return to its normal condition.

The chest may be drawn in at the attachment of the diaphragm, resulting from severe contractions of the diaphragm in early life, when the chest wall was flexible, as in long-continued whooping cough or chronic bronchitis.

Deformities resulting from injuries to the spine change the conformity of the chest.

Also repaired fractures of the ribs.

There may be a thickening of the junction of the rib and cartilage, producing prominences, like a row of beads, called the rachitic rosary from its cause.

Pigeon Chest.

The chest may seem to be compressed at the sides, producing an anterior bulging,

The ribs run backward from the front, the sternum standing sharply in front like in the pigeon, hence the name pigeon breast.

Cause—Long-continued obstruction in breathing in early life.

Occurs in catarrh, adenoid vegetations, enlarged tonsils, whooping cough, etc.

Funnel Chest.

The sternum, especially the lower part, may seem to sink into the chest.

While of no particular significance it is generally congenital.

More likely to occur in those of nervous temperament and light build.

If the depression is very deep it may cause interference with respiration.

Phthisical Chest.

Flat in the upper part.

Narrow ribs, delicate and sharply inclined from sternum, making a very sharp angle.

Intercostal spaces wide.

The scapulæ stand out like wings.

The epigastric angle much diminished

Emphysematous Chest.

The ribs usually at right angle to sternum.

The antero-posterior diameter is increased.

A general expansion in all directions.

The epigastric angle increased beyond a right angle.

The thorax usually short.

ABNORMAL MOVEMENTS OF THE DIAPHRAGM.

Litten's Sign.

A patient lying with feet pointed to a window, cross lights excluded and the chest exposed. Along both axillary lines a sort of a wave is seen to descend during inspiration and ascend during expiration. It moves from about the seventh to ninth rib; best seen in spare, muscular young persons in health.

More difficult to see in those who are very fat.

Cannot be seen when the pleural cavity contains air or fluid, when emphysema is present or pneumonia of the lower lobe, or with intrathoracic tumors low down in the chest.

Subdiaphragmatic tumors or fluid accumulations do not interfere with the phenomenon unless they are very large.

If the wave does not move two inches at least the condition of the lung is abnormal.

The wave is not visible in phthisis after the disease has extended down to the second rib in front and the middle of the scapula behind.

The waves, while in health may not be exactly equal on both sides, should not vary much.

ABNORMALITIES OF CHEST EXPANSION.

DIMINISHED EXPANSION.

General or Local.

Causes—Any obstruction to the entrance of air into the lungs or into the vesicle.

Overdistension of air vesicle, such as results from paralysis of the respiratory muscles or diaphragm.

Any restraint on the movement of the chest on account of pain.

Found in

Asthma, croup, contractions of bronchi by exudates or transudates.

Tumors pressing upon bronchi.

Phthisis, pneumonia, pleurisy.

Intercostal neuralgia, peritonitis, pregnancy.

Deformities of the chest, emphysema.

INCREASED EXPANSION.

General or Local.

Causes—Conditions in which large quantities of oxygen are consumed.

Some healthy part of the lung working to overcome the defects caused by some other portion affected by disease.

Occurs in violent exercise, fevers, pleurisy, phthisis, pneumonia, emphysema, asthma, etc.

DRAWING IN OF THE INTERCOSTAL SPACES AND INFRAMAMMARY REGION.

Causes—Any obstruction to the entrance of air.

Occurs in croup, asthma, bronchitis, tumors and aneurisms pressing upon air tubes.

A drawing in of the space over the apex beat or ensiform cartilage during dystole. Occurs in cases of adhesion of the heart and pericardium.

Since the development of the X-ray study we have had added to Inspection a most important aid, one which plays and will play even a greater part in our diagnosis of diseases of the chest.

By means of the fluoroscope we are able to closely observe the movements of both heart and lungs.

The action of the diaphragm is distinctly perceived and the two extremes of inspiration and expiration may be noted.

The change in healthy lung tissue from a lighter to a darker shade in passing from inspiration to expiration enables us to mark off any marked congestion long before any physical examination could discover it.

It is possible to distinguish generally between a thickening with adhesions or an effusion.

The extent, also, of the effusion can be discovered and the best place for tapping.

Latent or unresolved pneumonias can be readily seen when Auscultation and Percussion give no evidence.

In pulmonary tuberculosis the darker shade of certain areas and the restriction of the diaphragm which can be

seen before Palpation and Percussion can discover it, give us an early warning of the beginning of a tubercular process, which could otherwise not be discovered except by the presence of bacilli or the tuberculin test.

Congestion or œdema of the lungs, showing a weakened or diseased condition of heart or kidney may be distinguished from a tubercular process in that the lower part of both lungs show the deeper shading, while in tuberculosis one side only is generally shaded, and that at the apex.

And so many conditions which do not give us marked symptoms are discovered by the fluoroscope in their incipiency.

ABNORMALITIES IN TYPE OF RESPIRATION.

Abdominal Respiration may be prevented or restricted by:

1. Abdominal tumors.
2. Dropsy.
3. Pain.
4. Diaphragmatic pleurisy.
5. Gaseous distension of intestines.

Costal Respiration may be changed to increased abdominal respiration by any interference with:

1. The substance of lung occurs in phthisis pneumonia.
2. Its covering, seen in pleurisy.
3. The chest muscles, seen in intercostal neuralgia and rheumatism.

ABNORMALITIES IN FREQUENCY.

INCREASED FREQUENCY.

Causes—

1. Conditions in which respiration causes pain.
2. Conditions which cause narrowing or closure of bronchi.

3. Fever.
4. Nervous conditions.
5. Conditions which diminish the area of the air vesicles.

DIMINISHED FREQUENCY.

Causes—

1. *Drugs.*
2. Obstruction in upper air passage.
3. Diseases of brain.
4. Acute infectious diseases with marked mental dullness.
5. Last moments of life.

PALPATION OF THE THORAX.

Palpation should be made with the finger tips.

Attention should be given to acquiring a knowledge of different degrees of tension, resistance, etc., which may be discovered by a sensitive finger tip.

Can only be learned by practice.

We determine:

1. *The Condition of the Lung Tissue* by the variation in the thrill produced by the vibrations of the vocal cords, being communicated to the air in the air passages.

This thrill is termed VOCAL FREMITUS.

In health it is most manifest where the chest wall is thinnest.

The right side usually more distinct than the left, especially in the infraclavicular space.

The lower the tone of voice the more marked the fremitus.

Vocal Fremitus is Increased:

In all conditions which cause a slight consolidation of lung tissue around the air tubes.

Occurs in pneumonia.

Tubercular deposit.

Compressed lung from moderate pleuritic effusion.

Vocal Fremitus is Diminished:

In all conditions in which the lung is removed from the chest wall or in which the air is prevented from circulating in the air tubes.

Occurs in empyema.

Pleuritic effusion.

Obstruction of tubes by mucus.

Pressure upon them by tumors, etc.

2. *Pain and Localized Tenderness.*

Occurs in pleurisy.

Herpes is frequently preceded by localized tenderness.

Pneumonia with pleural implication frequently has with it pain and soreness upon pressure.

In phthisis the pain and tenderness usually depends upon the thickening of the pleura.

Caries of the ribs.

Periostitis.

Fractures or myalgia of the chest walls.

The latter can be differentiated by the sensitiveness of the muscles when taken between the fingers.

A continuous pain at the same place over the upper portion of the lungs is very suspicious of a localized tubercular process implicating the pleura.

Fractures of the rib are recognized by crepitation, deformities and pain at seat of fractures when any portion of the rib is subjected to pressure.

3. *Respiratory Movement.*

The lagging or symmetrical action of the sides of the chest and also of the diaphragm may be determined with much exactness.

In the latter case the finger tips should cover the epigastrium.

Any dissimilarity in contraction is easily discovered.

PERCUSSION OF THE THORAX.

In percussing the thorax we endeavor to determine the condition within:

1. By the character and pitch of the sound elicited, as compared with other known sounds.
2. The resistance recognized by the finger.

In percussing the percussion hammer answers the purpose better than the finger for percussing.

There are many reasons for this which are not necessary to enumerate, the fact remaining that greater percussion skill can be acquired with the hammer than with the finger.

Remember in Percussing—.

1. The finger should be firmly applied to the spot to be examined.
2. The deeper the organ or lesion in the chest, the more forcible must be the stroke.
3. Percuss both sides with the same force.
4. Percuss both sides at the same stage of respiration.
5. Percuss for comparison always, when possible, symmetrical points of the chest.

When percussing to elicit sounds, five or six strokes, quick and sharp, will bring a better idea of the pitch than slow and harsh strokes.

To recognize the resistance—A half dozen very slight strokes, not raising the percussion hammer beyond a half inch from the finger, and in rapid succession, give better and more satisfactory information.

This palpatory percussion, as it is called, requires much practice in order to become proficient.

The student in learning to percuss should begin and percuss only the infraclavicular spaces in the healthy subjects, in the child, adult and old person, until he can appreciate the volume, the resistance, the resiliency and the pitch, peculiar to this area.

Having mastered this, compare it with the flat sound over the liver.

After getting these two sounds clear to the ear, the gradations between them, as found in mammary, scapular, inter and infrascapular region, should be studied.

In this way anyone who wishes may become very proficient.

The standing posture is most convenient for percussion.

Back curved the least bit, head inclined slightly forward, perfectly straight.

Muscles all relaxed.

Percuss anteriorly the supraclavicular space, right and left, determining the upper borders of the lung in expiration and inspiration.

Then the infraclavicular spaces, right and left, keeping symmetrical points in view. Compare them as regards quality, pitch and intensity down to the third intercostal space.

From the third intercostal space on the right side downward percuss in the intercostal spaces only.

It is not compared with the left side further on account of the heart, which we percuss by itself.

In the axillary lines compare both sides of the chest.

The back is percussed, beginning at the apices, defining upper border of lung. Then downward, comparing each point with its exact opposite.

In severe diseases, with feeble strength, care must be exercised that the examination does not do more harm than the knowledge gained by you can benefit him.

In such cases usually use such methods as will give information concerning certain areas.

Bear in Mind in Percussing—

That the sounds are different in the various parts of the chest.

That the sounds of one chest are not to be compared with that of another, but that similarly situated points on the same chest are to be compared.

Differences in Sound are due to—

1. Age, which influences the elasticity of the chest wall.
2. The thickness of muscle and overlying fat.
3. The amount of air contained in the chest.
4. The condition of the lung tissue itself.
5. The force in percussion.

The right and left side of the chest should give similar sounds, except in the neighborhood of the heart.

The left side may give a clearer sound than the right, due to the underlying stomach and colon.

We do not percuss over the sternum, on account of its position and structure, which causes it to transmit the sounds of the lung as a pleximeter.

In percussing to determine the boundaries of the various organs we must do so with varying force, keeping in mind the depth of the organ, also the amount of air overlying.

The deeper the organ and the thicker the covering, the more forcible must be the stroke.

The more superficial and thinner the tissue of lung, the lighter the stroke.

In order to percuss intelligently it is necessary that one

know where the various organs lie within the chest, also the boundaries of them, as may be shown by percussion.

The apex of the lung anteriorly reaches from one to two inches above the clavicle, the height usually depending upon the length of the neck.

Posteriorly the upper limit corresponds to the spinous process of the seventh cervical vertebra.

Anteriorly, on the right side, in the mammillary line the lung joins with the liver at the sixth rib.

In the axillary line at eighth rib.

In the scapular line at the tenth rib.

The left lung lower boundary is slightly lower than the right.

The lower border of the liver in the adult averages—

Median line, halfway between the ensiform cartilage and umbilicus.

In the mammillary line, bend of the ribs.

Axillary line, tenth rib.

Scapular line, eleventh rib.

The differences in age must be kept in mind when percussing the lung and liver.

The liver area in infancy and childhood being much larger and the lung area smaller.

In old age the opposite obtains—i. e., the lung area being about one rib lower and liver area smaller.

In the adult the heart should be found in the triangle within the following points:

Middle of the sternum at lower border of second rib.

Fifth intercostal space, left mammillary line.

Mid-sternum at level of fifth interspace in mammillary line.

In children up to six years the præcordia is about the same as in the adult.

From eight years to puberty the area is relatively larger.

In old age the area is smaller on account of the dilatation of the air vesicles.

The spleen should be found, upon percussion, lying between the ninth and eleventh ribs in the space between the axillary line and scapular line.

It extends forward as far as the anterior axillary line.

Between the heart and lungs above, and the spleen on the left, liver on the right, is a space, called by Traube *half-moon shaped space,* which is of importance.

Any change in size of any of the adjoining organs makes a marked change in the shape of the space, from which we may determine the organ affected.

THE TRACHEA BIFURCATES.

Anteriorly—

At the junction of the second right costal cartilage and the sternum.

Posteriorly—

At a point on the level with the spine of the fourth dorsal vertebra.

THE COURSE OF THE RIGHT AND LEFT BRONCHUS.

Posteriorly—

Is from this point to a point on the eighth rib, two inches to the right and three inches to the left of the spine, respectively.

In the child, one and one and one-half inches respectively.

Anteriorly—

On the right the course is from the second right chondrosternal articulation to a point on the fifth rib, half way between the sternum and mammillary line.

On the left, to the fifth rib, just within the mammillary line,

PERCUSSION OF THE LUNGS.

Upon percussion we elicit certain sounds which we classify:

Normal vesicular resonance.
Flatness.
Dullness.
Tympanitic resonance.
Exaggerated resonance.
Amphoric resonance.
Cracked Metal resonance.

Normal vesicular resonance is a low-pitched sound.

The intensity varies with the force of the blow, the elasticity of the chest wall, thickness of covering of walls and the amount of air.

It is most marked in the infraclavicular spaces.

The least in the interscapular spaces.

The resonance varies in each region of the chest, hence each must be studied by itself, comparing it with its opposite.

The resonance being greater with the chest filled with air, the areas must be studied during the same period in respiration.

On the right side in some persons the resonance in the infraclavicular space in health may be slightly diminished.

On the left side any diminution of resonance is always abnormal.

Flatness *or suppressed resonance,* is a high-pitched sound, lacking the element of resonance and vibration.

Always attended with a sense of resistance to the finger.

In health it can be studied over the liver, below the border of the right lung.

The space between the lower border of the right lung and the upper border of the liver gives a dull sound.

Flatness in the chest occurs with:

Fluid in the pleural cavity or air vesicle.

Condensation or consolidation of lung tissues, resulting from infectious processes or pressure.

From the presence of new growths, as tumors, aneurisms, etc.

DULLNESS *or diminished resonance* is a sound whose *pitch* is higher than the normal vesicular resonance.

Resistance slightly increased.

In health can be studied over the spleen and heart.

Over the overlapping portion of lung and liver, or lung and heart.

Over the mammary gland in the female.

Over the entire chest in very fat persons.

Dullness is caused by the same conditions as flatness, but the conditions are not so marked in area or degree.

EXAGGERATED RESONANCE is a sound the pitch of which is higher and the intensity greater, but the resistance of the chest less than vesicular resonance.

It is caused either by—

1. The dilatation of the air vesicle.
2. The presence of increased intrathoracic pressure.
3. Diminished atmospheric pressure, such conditions as lead to dilatation of the air vesicles.

It is found generally over the healthy lung in pneumonia, if the consolidation is extensive.

If but one lobe is affected then it is found over the healthy part of the same lung.

In pleurisy with small effusion it is generally found above the middle of the chest on the affected side, if found at all.

In emphysema it is found over the entire chest.

TYMPANITIC RESONANCE is a sound, the pitch of which is

higher, intensity variable and a sense of still less resistance to the finger than in exaggerated resonance.

It can be studied in health over stomach and bowels.

The cause pathologically is a large space filled with air having fairly tense elastic walls capable of reflecting the vibrations of the air.

It occurs in—

Pneumothorax.

Phthisis.

Dilatation of bronchi.

Cavities in substance of the lung.

In childhood especially it is occasionally heard over solidified lung from the sounds of the deeper and overacting lung being transmitted.

The pitch in tympanitic sounds gives us a clew often to important facts.

In cavities that communicate with the air, the smaller the opening the lower the pitch, on percussion.

The larger the cavity the lower the pitch.

The lower the tension the lower the pitch.

Percussing over a cavity in the lung which opens into a bronchus, we have a higher pitch with the mouth open than with it closed.

This change of pitch is known as Wintrich's Change of Sound.

If in changing position of the patient in any way the opening in the bronchus becomes closed, the tympanitic tone changes to a dull or flat sound, which is termed the Interrupted Wintrich's Change of Sound.

If there is a consolidation at the left apex of considerable proportion, upon percussing it the resonance from the trachea is transmitted, producing a tympanitic sound, termed Williams' Tracheal Resonance.

In percussing over a lung cavity, changing the posture frequently produces a change in the pitch of the sound, caused by the change of the form of the air space, this is termed Gerhard's Change of Sound.

In percussing over a lung cavity, the sound produced at the height of inspiration is higher in pitch than that of expiration, due to the increased tension; this is termed Friedrich's, or Respiratory, Change of Sound.

AMPHORIC RESONANCE.

A hollow musical percussion sound, similar to that obtained in percussing an empty jar or large bottle.

It requires an air cavity, with rigid walls and a free communication with the bronchial tubes for its production.

It is best heard by placing the ear near the patient's open mouth and percussing with a slow, heavy stroke.

It occurs in:

Phthisical cavities.

Pneumohydrothorax.

Sometimes at the upper part of the chest in pleurisy, with marked effusion.

CRACKED METAL RESONANCE.

A short, loud, hollow, hissing sound, produced by percussing over phthisical cavities having flabby walls, from which the air escapes upon pressure from without.

It may be produced on the surface by laying the finger slightly bent along an intercostal space and percussing it in such a way as to drive the air from beneath the bent finger.

AUSCULTATION OF THE LUNGS.

In Auscultation, while there are some advantages in using the direct method—that is, of applying the ear directly to the chest—the disadvantages are greater, and, except in cases of

infancy and childhood, where good use can be made of the direct method, we use the stethoscope.

In the choice of a stethoscope, the point of greatest importance is to get earpieces that will fit the ear, so that something can be heard. Frequently earpieces are so adjusted that the bulb instead of being parallel to the axis of the auditory canal is at an angle, and thus canal is closed, preventing the sound which might be transmitted through the stethoscope from being heard.

First have your own stethoscope.

Arrange it so that you can hear a watch tick, at least as distinctly with the instrument as you can without it.

As a rule, patients either breathe too forcibly or feebly.

It requires some care to get them to breathe moderately deep, yet not hard or rapidly.

We classify the various sounds we hear as belonging to:

1. Vesicular Respiration.
2. Puerile Respiration.
3. Senile Respiration.
4. Laryngeal Respiration.
5. Bronchial Respiration.
6. Broncho-vesicular Respiration.
7. Cavernous Respiration.
8. Amphoric Respiration.
9. Exaggerated Respiration.
10. Feeble Respiration.
11. Jerking Respiration.
12. Prolonged Expiratory Respiration.

Respiration is made up of two parts—Inspiration and Expiration.

When we listen to the sounds of Inspiration and Expira-

tion at different parts of the chest, we find that they differ in length relatively and respectively.

The relation respecting length of sounds we term Rhythm.

They will be heard louder in some points than others, which is termed Intensity.

The tone will be found to vary, which is termed Pitch.

The sound may be soft, harsh, rough, tubular or blowing, which is designated as Quality.

We distinguish all sounds by these four marks, Pitch, Rhythm, Quality and Intensity.

Any changes produced by disease must show themselves by a change in one or more of these four marks.

Before it is possible to determine what is abnormal there must be a knowledge of the peculiarities of the Pitch, Rhythm, Quality and Intensity of each area of the normal chest.

VESICULAR RESPIRATION.

INSPIRATION.

Quality—Soft, breezy.

Pitch—Higher than Expiration.

Rhythm—Longer than Expiration.

Intensity—Greater than Expiration.

EXPIRATION.

Quality—Feebly blowing.

Pitch—Lower than Inspiration.

Rhythm—Shorter than Inspiration.

Intensity—Less than Inspiration.

The Pitch of both Inspiration and Expiration is lower at the left apex than right.

The length of the expiratory sound is only about one-third as long as the inspiratory sound.

The expiratory sound is absent in about one-half the chests auscultated.

Inspiration and Expiration are blended together so that there is no interval between them.

Vesicular Respiration should be heard at all points of the chest excepting at the upper part of the sternum where it joins the clavicle.

Posteriorly at the upper and central portions of the interscapular space.

In these locations we find a change of the Quality, Pitch, Rhythm and Intensity.

The Intensity varies according to the location.

It is greater in the upper part of the chest, infraclavicular, interscapular and axillary spaces than in the scapular, mammary or inframammary spaces.

The Intensity varies in different persons in health.

Age, elasticity of chest wall and vital capacity, etc., determine it.

PUERILE RESPIRATION.

In childhood the Intensity of respiration is much greater than in the adult.

The Rhythm Inspiration is lengthened Expiration is nearly always present. This modification of Intensity and Rhythm we term puerile respiration.

SENILE RESPIRATION.

In old age the Intensity of respiration of the healthy chest is not so great.

The *Quality* and *Pitch,* however, are the same as vesicular respiration, but the Rhythm of Expiration slightly lengthened; this change in the *Intensity* and *Rhythm* is termed senile respiration.

LARYNGEAL RESPIRATION.

If the stethoscope is applied over the notch of the sternum we hear sounds which differ greatly from the sounds of vesicular respiration.

INSPIRATION.

Quality—Tubular, hollow.
Rhythm—Shorter than Expiration.
Intensity—Less than Expiration.
Pitch—High, but not as high as Expiration.

EXPIRATION.

Quality—Tubular, hollow.
Rhythm—Longer than Inspiration.
Intensity—Greater than Inspiration.
Pitch—Higher than Inspiration.

The two sounds will be separated by a slight interval.

They will not last during the whole of the respiratory act.

This change in Quality, Pitch, Rhythm and Intensity we term laryngeal respiration. Here we learn one of the most important facts in chest examination, that is, that while in about one-half or one-fourth of the cases in health one cannot hear the expiratory sound, any marked increase in its length or loudness, so that it equals or is longer than inspiration, is an indication of the presence of a diseased condition, which interferes with the elasticity of the lung.

CHANGES IN VESICULAR RESPIRATION.

Effecting especially Quality and Pitch.

While there are many adventitious sounds which may be heard in Abnormal Respiration, the most important part of your work is not the determining their presence or absence,

but the discovery of slight changes in the Quality, Pitch, Rhythm and Intensity at one location or another.

Changes which mark slight departures from the normal and are discovered early can be remedied, but continuing for months and years unchecked place their possessor beyond the reach of help.

BRONCHIAL RESPIRATION SAME AS LARYNGEAL RESPIRATION.

INSPIRATION.	EXPIRATION.
Quality—Tubular.	Same.
Pitch—Lower.	Higher.
Rythm—Shorter.	Longer.
Intensity—Less.	Greater.

A slight pause occurs between Inspiration and Expiration.

Bronchial Respiration occurs and is heard at points of the chest.

1. In which the lung tissue has been partially or completely solidified.

2. Compressed sufficiently to suppress the vesicular respiration.

The compressed or solidified lung forms a better conductor of sound than the healthy lung and transmits it more distinctly to the ear.

It occurs in—

Phthisis and pleurisy in the upper part of the chest.

In pneumonia usually at the lower part.

BRONCHO-VESICULAR RESPIRATION

Is a murmur in which the Quality, Pitch, Rythm and Intensity of the sound is so modified as not to belong to either Bronchial or Vesicular Respiration, but is intermediate.

It is found in same conditions as cause Bronchial Respiration, in which but a small portion of the lung is affected.

CAVERNOUS RESPIRATION.

INSPIRATION.	EXPIRATION.
Quality—Blowing.	Blowing.
Pitch—Low.	Lower.
Rhythm—Prolonged.	Prolonged.
Intensity—Same.	Same.

A pause occurs between Inspiration and Expiration.

It is a hollow sound of varying Intensity, but never so great as bronchial respiration.

The sounds seem to follow Inspiration and Expiration rather than occur with them.

Produced by the passage of air to and from a cavity and heard over this cavity.

It is usually at the summit of the chest.

It is found in—

Phthisis.

Abscess of the lung.

Gangrene.

Cancer.

Dilatation of the bronchi.

AMPHORIC RESPIRATION.

INSPIRATION.	EXPIRATION.
Quality—Hollow, blowing, musical.	Same if heard.
Pitch—High or low.	High or low.
Rhythm—Usually shorter.	Usually longer.
Intensity—Variable, with pitch.	Variable, with pitch.

Amphoric Respiration is produced by a current of air passing from a bronchial tube into a cavity, or across the opening of a cavity in such a manner as to produce a vibration of the air within the cavity.

The Pitch and Intensity vary with—

The angle formed by axis of tube and cavity.

The size of the opening of the cavity, rapidity of the current of air.

It is usually limited to a small space between third and sixth ribs between the scapular and axillary lines; may be suffused over the whole chest.

It is most frequently found in pneumohydrothorax.

It occurs sometimes in phthisis and pulmonary abscess. Amphoric respiration is not always present in pneumohydrothorax.

CHANGES IN VESICULAR RESPIRATION.

Intensity changed.

EXAGGERATED RESPIRATION.

Vesicular Respiration with increased Intensity, called exaggerated respiration.

Is of the same Intensity as the Intensity in the child up to eight years of age.

It is produced in disease by—

Overaction of certain healthy portions of the lung endeavoring to make up for the diminished action of certain other portions either destroyed or disabled.

May be heard on the healthy side or over the healthy portion of the diseased lung, not peculiar to any portion.

The Intensity being increased the expiratory murmur is always heard.

LofC

It occurs in—
Pleurisy.
Pneumonia.
Phthisis.
Spasmodic Asthma.
Aneurism.
Tumors which press upon the bronchi.

If heard all over both lungs it is not a sign of disease but an individual peculiarity.

FEEBLE RESPIRATION.

Respiration with diminished Intensity, called feeble respiration.

The respiration being weakened, Inspiration is the only sound generally heard.

Its duration is shortened.

Expiration if heard is usually prolonged.

It is produced by either—

1. Some obstruction to the entrance of air in upper air passages.
2. Some obstruction to the entrance of air into or overdistension of air vesicle.
3. Some restraint in motion of chest.
4. The sound may be imperfectly transmitted on account of thickness of chest wall or fluid in pleural cavity.

There are many causes of feeble respiration and to be of any value in diagnosis it must be connected with other symptoms.

SUPPRESSED RESPIRATION.

No sound is heard.

Causes—

1. No air enters the lung.
2. Fluid or air is present in the pleural cavity, deadening any sound produced.

When it occurs it indicates either—

An excessive effusion of fluid.

Air in the pleura; or

A very greatly obstructed lung.

JERKING RESPIRATION.

Respiration with interrupted rhythm, called jerking respiration.

The Inspiration especially, and also Expiration, instead of being continuous from beginning to ending, are broken into a number of parts, producing a quivering sound.

It is sometimes heard over the entire chest.

Causes.

Nervousness or fear of breathing on account of pain.

As in Pleurisy, Intercostal Neuralgia, etc.

It may be limited to a portion of the chest, usually the upper or middle portion of the chest.

Causes.

Some obstacle to the entrance of air into the vesicle.

As a tubercular deposit, mucus, etc.

Some contraction of the caliber of the tube.

As in Incipient Phthisis, Circumscribed Bronchitis, Asthma, etc.

PROLONGED EXPIRATION.

Respiration so changed that the Expiration is not only relatively longer but is also lengthened, while Inspiration is generally shortened.

It may be heard—

Over limited portions of the chest.

Over one or both sides.

Causes.

Either an overdistension of the air cells and diminished elasticity.

As in Emphysema.

Or tubercular deposits in the walls and entrances of the air cells, which makes it difficult for the air to escape.

In emphysema the sound will be softer and a low pitch.

In tubercular deposits the sound will be harsh and high pitch.

SOUNDS OCCURRING WITH RESPIRATION OR COMPLETELY DEADENING IT.

RALES.

Rales are sounds produced by obstructions to the entrance of air into the trachea, bronchial tubes or air cells.

Causes may be—

Secretion in them.

Contraction of their fibers.

Swelling of the mucous membrane.

Pressure upon the tubes from without.

All rales are pathological.

It is important that we bear in mind the influence of position upon the production of rales.

Small rales frequently are found upon examination of the patient lying down, which were not audible in the sitting or standing posture.

- *Rales*
  - Dry
    - Sonorous.
    - Sibilant.
  - Moist
    - Coarse bubbling.
    - Fine bubbling.
    - Subcrepitant.
    - Crepitant.
    - Cavernous.

Dry Rales—

Are musical, resonant sounds, produced by—

Contraction of the glottis.

Irregular diminution of size of the tubes from spasm.

Swelling of mucous membrane.

Cicitrization of ulcers.

Pressure of a tumor.

They occur in the trachea, larynx and bronchi.

Sometimes the laryngeal or tracheal dry rale is transmitted through the chest, and unless the point of greatest intensity is sought they will be thought to arise in the chest.

They may occur with both Inspiration and Expiration, but oftener with Inspiration.

They are found in—

Croup.

Whooping Cough.

Laryngismus stridulus.

Morbid growths.

Tumors, etc.

BRONCHIAL DRY RALES are of two kinds—

Sonorous.

Sibilant.

Sonorous, as the name indicates, is a full, round, low-pitched sound.

Occurs in larger bronchi, with either Inspiration or Expiration.

Oftener with Expiration.

Occurs in Asthma, Bronchitis.

If found over a limited area on one side, especially at the apex, it is probably a localized bronchitis, resulting from pneumonia or phthisis.

Sibilant rales are high-pitched, hissing sounds, which may occur with both Inspiration and Expiration.

Oftener with Inspiration.

Indicates same conditions as required to produce sonorous rales, but that the smaller tubes are affected.

MOIST RALES.

Moist rales differ from the dry rales in that the sound bears with it a characteristic liquid sound, such as is produced by air bubbling through or rushing over a fluid.

They may occur in the larynx, trachea, bronchi, air vesicle and cavities.

When numerous they are all heard with both Inspiration and Expiration.

Exceptions—

The crepitant rales are heard only on Inspiration.

The sounds are of such a character that we can judge very accurately as to whether they have occurred in large or small tubes or in a cavity.

This is of the greatest importance in many conditions.

In children, in a progressing bronchitis we can thus determine its advancement, as the rales become smaller, finer and higher pitched.

The size of the rale at the apex gives us, also, important evidence.

As it contains but small bronchi, large rales cannot occur there except there be a cavity.

Frequently one may hear large rales over the apices, which do not occur there, but are transmitted from the trachea or large bronchi at the center of the chest.

Here we learn, also, some important facts concerning rales, i. e., that—

1st. *The loudness of a rale* does not depend upon the severity of the disease nor the number present, but upon the force of respiration.

2d. *Its greatest intensity* is directly over the place where it is produced.

3d. Determining the point of maximum intensity of any individual rale, we are able to locate the place from whence it arises.

MOIST TRACHEAL OR LARYNGEAL RALES.

Are bubbling sounds produced by air passing through any liquid secretion, in either larynx or trachea.

They are heard with both Inspiration and Expiration.

They occur—

In last moments of life.

Coma.

Any conditions of inability to expectorate, as Quinsy, Peritonsilar abscess.

MOIST BRONCHIAL RALES.

They are divided into three classes—

Coarse bubbling.

Fine bubbling.

Subcrepitant.

Coarse bubbling rales are low-pitched sounds, conveying the idea of bubbles of considerable size.

They are heard with both Inspiration and Expiration.

Are constantly changing position.

Are diffused over the whole chest.

When occuring at one place, especially at upper part of chest, there is a cavity present.

As found in Phthisis.

Over one or both sides.

Bronchitis, pulmonary apoplexy, etc.

Fine bubbling rales.

A fine bubbling sound of high pitch.

Occurs in the smaller tubes.

Found in same conditions as coarse bubbling rales.

SUBCREPITANT RALES.

A very fine, high-pitched, slowly-evolved sound.

Occurs in the bronchioles.

May be heard with both Inspiration and Expiration.

With Inspiration and Expiration it occurs between the beginning and ending.

The coarse or fine bubbling rale may be suppressed or changed by coughing.

The subcrepitant rale is usually not so affected.

When heard on both sides of the chest—

Suspect capillary bronchitis, pneumonia, œdema or pulmonary apoplexy.

On one side only.

Pneumonia in the stage of resolution.

CREPITANT RALE.

Is a fine, high-pitched sound, rapidly evolved.

And very much like the sound transmitted to the ear, by closing the lips, placing the tongue against the roof of the mouth and sucking.

It is not changed by coughing.

Occurs in air vesicle.

Being produced by the sudden separation of the adhering walls of the air cells, it is heard only at the end of Inspiration.

Heard at the location of the disease—

Which is nearly always a pneumonia.

It may be found in the upper part of the chest—

In a circumscribed pneumonia, complicating phthisis.

CAVERNOUS RALES.

Are hollow, intense, gurgling sounds, which occur in cavities.

Produced by the air passing through or over the surface of fluid in a cavity either in the lung tissue itself or formed by a dilated bronchus.

The pitch varies with—

1st. The size and shape of the cavity.
2d. The size of the openings into it.
3d. The tension of air within it.

When heard at the apex—

It is caused by Phthisis almost exclusively.

Nearer the middle of the chest, more likely dilated bronchi.

METALLIC TINKLING.

Sometimes in listening to the sounds of the chest there is heard a high-pitched, short, musical sound, accompanying speaking, coughing or respiration, irregular in intervals and sounding like the dripping of water into a partly filled vessel.

Heard most frequently at the middle of the chest, anteriorly or posteriorly.

Causes.

A large cavity with liquid and air.

It may sometimes be found over phthisical cavities, but almost exclusively it is caused by pneumohydrothorax.

FRICTION SOUNDS.

There also occur within the chest dry, creaking sounds.

Similar to the creaking ŏf a stiff collar upon the neckband of the shirt.

Sometimes very indistinct; other times very loud, so that the patient himself can hear it.

It may be heard in the axilla.

At the apex of the lungs.

Level of third rib, left side.

The sound seems close to the ear; is jerky.

May occur with Inspiration or Expiration, or when patient refrains from breathing.

It is not changed by coughing.

Pressure over the spot where it occurs usually intensifies it.

Heard generally over a narrow area.

It is produced by the rubbing together of two pleural or pericardial surfaces which have been thickened by lymph or other deposits.

If the pleural surfaces—

Then it is heard with Inspiration and Expiration or Inspiration alone, and is found in the axilla, at about seventh or eighth rib, or apex.

When in the axilla—

It is pleurisy.

At the apex—

Tuberculosis.

Recurring, it matters not where located, it generally arises from a tubercular process in close proximity.

If it arises from the pericardial surfaces—

The sound is heard best on left side, at level of third rib.

Is rhythmical with the pulse.

Continues while the patient holds his breath.

VOICE SOUNDS.

In health.

If, when a person is talking, we place the stethoscope at different parts of the chest we will observe that in some portions there will be a marked resonance, with a vibration or thrill, the sound seems very near the ear.

In other portions the sound seems diffused and farther away.

In other portions it is absent altogether.

By carefully noting the voice sounds in health we soon learn to detect an abnormal condition.

We have two types with which we compare all voice sounds, viz.:

Tracheal Voice.

Thoracic Voice.

Tracheal Voice.

If we place the stethoscope upon the thyroid cartilage at the side of the neck and the patient utters words, they seem to be very near the ear, just as if they passed directly through the stethoscope.

This is termed tracheal voice.

It is accompanied by a slight shock and a thrill, termed fremitus.

Tracheal Whisper.

If, instead of the patient uttering words, he whispers them, there is but slight, if any, shock or thrill.

The sounds are more or less imperfectly transmitted.

This we term tracheal whisper.

If now, instead of whispering, he simply breathes forcibly, we will notice that the expiratory sound is the same as the whisper sound.

Thoracic Voice.

If now the stethoscope is placed over the infraclavicular or interscapular region, the voice sounds will be found much weaker than at the thyroid cartilage.

The sound being diffused and intensity greatly diminished.

Termed Thoracic Voice.

As we proceed downward, both anteriorly and posteriorly, this intensity is diminished; there may be found some slight difference between right and left side, in that on the right the sound is slightly increased in intensity.

Any increase upon the left is always abnormal.

Thoracic Whisper.

If here, as at the thyroid cartilage, the patient whispers, we hear a sound similar to that produced by ordinary Expiration, excepting that the sound is more intense in the whisper.

It is important that one should study the voice sounds, both of the child and the adult, very carefully, so as to appreciate the differences in fremitus, intensity and quality at different parts of the chest in health before studying the voice sounds in disease.

VOICE IN DISEASE.

Classified as—

Increased thoracic voice and whisper.
Diminished thoracic voice and whisper.
Suppressed thoracic voice and whisper.
Bronchophony and whispering bronchophony.
Cavernous whisper.
Amphoric voice and whisper.
Pectoriloquy and whispering pectoriloquy.
Aegophony.

INCREASED THORACIC VOICE.

If in certain portions of the chest there happens to be a limited congestion or consolidation of lung tissue, so that it becomes a good sound conductor, the sounds of the voice in the chest are more distinctly transmitted to the ear.

They are not changed in quality, but are heard more distinctly.

Usually the sound of Inspiration at such points is harsh and shortened.

The pitch of Expiration being raised and rhythm lengthened.

Termed Increased Thoracic Voice.

INCREASED THORACIC WHISPER.

If over this same area we listen to whispered words, the sound will be more intense than in health, the Pitch will be raised, the Quality inclined to tubular; in other words, will be identical with the sound of Expiration, in broncho-vesicular respiration.

Increased thoracic voice and whisper occurs in—

Incipient Phthisis.

Pneumonia.

Pleurisy, with moderate effusion.

All conditions causing slight consolidation of lung tissue.

DIMINISHED THORACIC VOICE AND WHISPER.

If the lung is removed from the chest wall or the air prevented from circulating in the bronchi—

Instead of hearing the voice sounds as in health, the sound will be diminished in intensity, and as we have here no standard, the symmetrical points of both sides are to be compared, the whispered words will be feeble and very distant.

SUPPRESSED THORACIC VOICE AND WHISPER.

No sound is heard.

Diminished and suppressed thoracic voice and whisper occur in cases of—

Pleuritic effusion.

Empyema.

Pneumohydrothorax.

If the pleural cavity is but partly filled with fluid—

Then below the surface of the liquid—

We will find thoracic voice diminished or suppressed.

While above it—

The thoracic voice may be increased.

BRONCHOPHONY AND WHISPERING BRONCHOPHONY.

The sound of the voice seems near the ear.

The pitch being higher, while the intensity varies.

The whispered sounds are of the same Quality, Pitch, Intensity, as the sound of expiration at the thyroid cartilage.

It requires more extensive solidification for the production of bronchophony and whispering bronchophony than for increased thoracic voice and whisper, but the conditions causing both, and significance, are the same.

PECTORILOQUY AND WHISPERING PECTORILOQUY.

We may hear the sound of the voice not only near the ear, but the sounds even transmitted clearly to the ear.

Just as if spoken through a speaking-tube.

It is heard better with the whispered words than with the voice.

It is found—

Over any area that has the lung tissue condensed around a bronchus of some size, and presses against the wall of the thorax.

Over cavities with smooth walls, which are capable of transmitting vibrations.

Occurs in Phthisis.

Pneumonia.

Bronchial dilatation.

CAVERNOUS WHISPER.

When the stethoscope is placed over a cavity with flaccid walls in the superficial portions of the lung, and the patient instructed to whisper words, there is heard a low-pitched, blowing sound, which will be found identical to the expiratory sound over the same area.

This is most usually found at the upper portion of the chest, but may be found in other portions.

AMPHORIC VOICE AND WHISPER.

Sometimes when listening over the chest to voice and whisper there is heard a musical sound, wafted to the ear like an echo.

The Intensity is very slight.

The Pitch variable, but inclining to high.

Instead of a cavity with flabby walls, there must be rigid walls, capable of transmitting a vibration.

As is found especially in—

Pneumohydrothorax.

Sometimes also in phthisis there are found also the conditions necessary for its production.

AEGOPHONY.

There may be heard a squeaking, creaking, quivering sound, likened to the bleating of a goat or sheep.

Occurs when the patient speaks, but the sound, separate from and of higher pitch than the voice, or after the voice sound, with diminished intensity.

It denotes a pleuritic exudation or effusion.

Is most frequently found at the upper boundary of the dullness.

PLEGAPHONIA OR AUSCULTATORY PERCUSSION.

In a number of conditions, where it is not advisable or impossible for the person to speak or whisper, Scherwald has devised a procedure which is as follows:

Have an assistant percuss a pleximeter placed upon the surface of the thyroid cartilage.

The mouth of the patient should be closed; percuss during expiration.

Upon auscultating the chest, if it is normal—

The sound of the percussion is heard rather weak at the apex.

Where it is loudest and gradually diminishes, as we proceed downward—

If there is any infiltration present the sound is very loud and tympanitic, with Wintrich's Change of Sound.

If there is effusion in the pleura the sound will be weakened or suppressed.

If open cavities, loud and thumping.

MENSURATION.

While the measurement of the thorax does not give one as definite knowledge of the chest as that obtained by Auscultation, Percussion, Inspection, etc.

Yet by means of it we may obtain valuable data, from which we can better make a prognosis.

By means of it we can determine the change which takes place or has taken place by disease.

We are enabled to judge of an increase or diminution of the amount of a pleural effusion.

The increase in size of tumors, aneurisms, etc.

Also to judge of the relation of its development to the rest of the body.

The diameters of the chest are measured with a caliper compass.

The lateral diameter being taken at the highest point in the axilla.

The antero-posterior diameter at the level of the angle of Louis.

The circumference at the level of the nipple.

The length from the clavicle to the border of the ribs in the mammillary line.

The right and left half of the chest varies in size, according as the person is right or left handed, being from one-fourth to three-fourths larger on the side the hand is used best.

SPIROMETRY.

The measuring of the vital capacity of the lung.

The spirometer usually consists of a cylindrical vessel arranged over water (an index of its capacity at different points marked upon it), the inside being connected with a tube, so that the air from the lungs may be exhaled into it.

There exists a fairly uniform relation between the size of the body and the chest capacity.

This relation, however, may be altered by the daily practice in expanding the chest.

Also by age.

From 40 years the vital capacity diminishes about 25 c.c. yearly.

The relation of height in centimeters to vital capacity in cubic centimeters, in the male, should not be less than 1 to 20.

In the female 1 to 17.

When less than this there is a great probability of lung disturbance.

If, however, the relation increases 4 or 5, such a condition is altogether likely absent.

COUGH AND EXPECTORATION.

Coughs may be divided into two classes:

Those which arise from the pulmonary tract.

Those which are of a reflex origin.

Cough which arises from the pulmonary tract is due usually—

Either to the hyperæsthetic and hyperæmic condition of the interarytenoidean space and bifurcation of the trachea.

Or to the irritation produced at those points by the products of disease being carried there.

Anything, therefore, which prevents the mind from taking cognizance of that irritation is likely to abolish coughing.

Even though the conditions are present for producing it.

As results in diseases of the brain or conditions affecting the brain.

The last moments of life.

After drugs, such as opium, etc.

The sudden stopping of cough and expectoration, under such conditions, when accompanied by weakness, means that the person is drowning in his own secretions.

The frequency of the cough bears no relation to the extent of the lesion.

Coughing in the morning upon awakening occurs most frequently with phthisis and chronic bronchitis.

Coughing in severe paroxysms upon arising, with abundant expectoration, is peculiar to bronchiectasis.

Coughs which do not arise from diseases of pulmonary tract, classified as nervous.

They are found in both child and adult.

Often they are the cause of much annoyance and care in the attempt to locate them.

The nocturnal, hacking cough of childhood is due to naso-pharyngeal obstruction.

The paroxysmal, hacking cough of childhood, with emaciation, lack of appetite, normal temperature and negative physical signs—

Occurs in the overworked school child, with an unbalanced central nerve action.

Troublesome coughs follow—

Diseases of the tonsil,
Pharynx,
Naso-pharyngeal space.
Mucous polypi and excrescences.
Lymphoid tissue.
Foreign bodies at the base of the tongue.
Elongated palate.
Varix at base of the tongue.

A dilated heart should always be kept in mind as a cause of cough.

The abdominal organs, spleen, liver, stomach, uterus, etc., are often the offending members.

Arising from the uterus, it is usually accompanied by other disturbances.

It occurs during menstruation, gestation, dislocations and new growths.

It is also excited by a full bladder or rectum and physical excitement.

As a rule it is followed by exhaustion.

Pain is found at the insertion of muscles of abdomen and chest.

In the male—

Inflammation and swelling of the testicles,

Urethritis and cystitis,

May be the cause of a cough.

We find a cough present in—

Tabes, Epilepsy.

Rheumatism.

Chorea.

Injuries to the cervical region of spinal cord.

Hysteria.

Tumors.

Pressure upon the trunk of the vagus.

Enlargement of the cervical lymphatic glands.

Goiter.

Aneurism of aorta.

In deep-seated neck and throat abscesses.

The presence of impacted cerumen.

Packing the ear with cotton,

Or cleansing it.

Occasionally the influence of cold air upon the external ear is the cause of coughs.

The reflex cough is peculiar in that it is not accompanied with much, if any, secretion.

In the majority of cases it ceases during sleep.

Recurs upon wakening.

Cough due to diseases of pharynx—

Is severe, paroxysmal, most violent at bedtime, midnight and on awakening.

Is accompanied with a thick tenacious secretion.

In whooping cough, also, the cough is paroxysmal, but there is but slight secretion.

Inspiration is noisy, and as respiration is diminished there is dyspnœa and blood stasis.

EXPECTORATION.

By expectoration we understand the fluid or semi-fluid matter—

Which, secreted by the lungs, air passages or cavities opening into the lungs, is expelled by coughing and spitting.

A careful examination of this matter should be made in all diseases of the respiratory tract.

As the chemical and microscopical examinations belong to other departments, we will consider only such characters as quality, quantity, consistence, color, odor, etc.

As to quality, it may consist of mucus, pus, serum and blood, separately or combined.

Mucous Expectoration.

A clear, glairy-looking substance, like the white of an egg.

Peculiar to the early stages of acute bronchitis and catarrhal processes of the upper air passages.

Purulent and Muco-purulent Expectoration.

A yellowish, thick, opaque substance, which, placed in water, sinks to the bottom of the vessel.

Occurs in the latter stages of an acute bronchitis.

Purulent bronchitis.

Pulmonary abscess.

Bronchiectasis.

Tubercular cavity.

Empyema rupturing into a bronchus.

A sudden expectoration of a large amount of pus points to the rupture of some abscess cavity into a bronchus.

Serous Expectoration.

A very liquid, watery substance.

Markedly frothy.

Very freely expectorated, consisting of blood, serum and mucus.

Peculiar to pulmonary œdema.

Latter stages of Bright's disease.

Heart failure, etc.

Bloody Expectoration, one in which there is more or less mixture of blood.

May arise from a number of sources, but occurs more frequently from Phthisis than from any other cause.

It may arise from valvular diseases of the heart.

Aneurism, anæmia, rupture of small vessels on posterior pharyngeal wall.

From the gums.

The Quantity

Varies from the smallest trace, in which the sputum is merely streaked.

To mouthsful in Phthisis.

It may occur at the beginning or during the course of the disease.

It may occur but once or frequently.

When resulting from cardiac causes the quantity is usually quite large.

Blood escaping into the lung cavities is usually coughed up immediately.

This gives us one of the most important data for determining the origin of a hemorrhage.

The bright red, frothy appearance of the substance always marks its origin from the lungs.

But, on the other hand, dark, reddish brown expectoration does not always mean a stomach hemorrhage.

In some cases blood is poured into the cavity of the lung in such quantities that it is not all expectorated or is retained and becomes dark in color, slightly coagulated, and when discharged is not unlike that in hematemesis.

Again, blood may flow from the nose, mouth or pharynx during sleep into the larynx, trachea and bronchi, and, being mixed with air, it becomes a brighter red, which, when discharged by coughing, may appear very much like that arising from the lung itself.

Such cases all need very careful examination if we would avoid errors.

Blood in streaks through the sputum usually has its source from the upper air passages.

Specks of blood are frequently found in the earlier and later stages of caseous degeneration of tubercular process.

The Odor of the Expectoration.

The sputum generally possesses a faint, disagreeable odor.

That arising from certain conditions, such as abscesses, bronchiectasis, fœtid bronchitis, has an extremely offensive putrid odor, tainting even the expired air.

It should also be remembered that

Putrefying fragments of food.

Caries of the teeth.

Plugs from the lacunæ of the tonsils.

Certain disorders of the cavity of the mouth, may communicate an offensive odor to the sputum during its passage through the mouth.

Color of the Expectoration.

The color may vary, in all shades, from white to black.

The lighter shades being due to the presence of more or less pus cells.

The deeper tints due to the presence of the red coloring matter of the blood and the changes it undergoes in oxidation, like that witnessed in an effusion of blood under the skin.

Still darker shades, due to the presence of biliary pigment.

Black in those especially living in a dusty, smoky atmosphere, or employed in such work as brings them in contact with fine, powdery matter.

THE HEART.

As with the lungs, so with the heart, if we are to be able to diagnose the disturbances correctly, we must know something of the anatomical position and physiological mechanism of the normal heart, before we will be able to comprehend what lesions are present and what results may follow any of its pathological conditions.

Mechanically considered, the heart is simply a suction and force pump, and is therefore under the same laws as govern the action of such pumps in general, as regards the velocity and quantity of the efflux.

If these laws, as laid down in Physics, are not perfectly clear in your mind, you should carefully study them before proceeding further.

The Anatomical Position.

In the frozen subject which we presume is like the condition in life, the heart is found to be

An irregular, four-sided pyramid.

Its base upon the diaphragm.

The apex replaced by the trunks of the large vessels.

Presents five surfaces.

The Anterior, Posterior, Inferior, Right and Left.

The anterior surface is triangular, slightly convex, directed forward and slightly upward.

It contains the most of the right ventricle.

A small portion of both the left ventricle and the left auricular appendix.

The whole of the right appendix and part of the right auricle.

At the superior angle it merges into the aorta and pulmonary artery.

At the left inferior angle we have the clinical apex.

The right surface

Is a convex quadrilateral, almost vertical and directed to the right.

It includes the greater part of the right auricle.

The left surface

Is a convex, triangular surface, directed upward and toward the left; in it is found the most of the left ventricle and left auricular appendix.

The posterior surface,

The so-called base of the heart,

Is an irregular, four-sided surface, narrower above than below, convex, vertical and directed backward; in it is found the left auricle and a small portion of the right auricle.

The inferior surface

Is a four-sided, nearly flat surface.

It is directed downward, a little backward and toward the right it contains a small portion of the right and left auricle.

The most of the surface is about equally divided between the right and left ventricle.

Superficial limits

In the adult.

The apex of the pyramid is found to be at the level of the upper margin of the third costo-sternal articulation.

Extending one-half an inch to the left and one inch to the right of the middle of the sternum.

This is the upper limit of the heart.

The lower left anterior angle will correspond to a point midway between the fifth and sixth rib, three and one-half inches to the left of the median line of the sternum.

The lower right anterior angle will correspond to a point one inch to the right of the median line of the sternum, at a level of the articulation of the sixth costal cartilage with the sternum.

The lower limit of the heart will correspond to a line joining these two points.

Joining the upper and lower limits with concave inward lines, we have the average superficial limits of the heart.

The heart, instead of occupying a vertical position in the chest, as is generally supposed, occupies a mixed oblique one.

Its position is represented by a line drawn from behind forward, from above downward, from right to left.

The left side of the heart is the most posterior, and also inferior.

The left auricle lies deep down in the space between the diaphragm and spinal column, just in front of the eighth dorsal vertebra.

The blood which passes through it into the left ventricle flows in a line from behind forward, from right to left, from below upward, or directly across, but never from above downward.

The course of this line is from the eighth dorsal vertebræ through the chest, coming out in front at the junction of the fourth rib with its costal cartilage.

This position of the heart must be kept in mind when we are studying the diseases of the heart.

It explains many important symptoms.

It shows us how we can mechanically assist the heart.

The auricle, being much less muscular than the ventricle,

is easily embarrassed in its effort to propel blood against an obstruction.

It soon loses its inherent strength by the overdistension of its cavity.

This position of the heart we believe to be one of the most potent factors in producing the very frequent occurrence of its disease in the human family.

The habit of sleeping upon the back we believe to be another one.

INSPECTION AND PALPATION OF THE HEART REGION.

The apex beat is the starting point.

It is of the greatest significance and importance in the diagnosis of heart lesions.

It gives us the indications for treatment.

It is of much more value in any case than is the character, pitch and time of any murmur which may be present.

If the apex beat is in its normal position you will rarely find a valvular lesion.

If one is present it needs no attention.

Prof. Gerhardt says:

A heart lesion which does not change the position of the heart beat or cause dullness to the right of the sternum needs no treatment and should not be interferred with, as such interference will do more harm than good.

The size of the heart is an important guide to our diagnosis of its condition.

Unfortunately, it cannot be well determined by inspection, palpation or percussion in certain cases, and it is here that the fluoroscope has proved of such marvelous value.

By it alone can we positively assert the presence of an enlarged or atrophied heart.

This is especially important in emphysema, where the gen-

eral condition markes it otherwise so difficult to obtain an exact idea of the size of heart.

Not only can an enlargement be discovered, but also the enlargement of any particular portion of the heart.

By being able to observe its size, shape and position, we can get information of effusions, adhesions and valvular defects that can be had in no other way.

New growths, aneurisms, etc., of which symptoms are so varied and frequent, not even suspected, are shown by the fluoroscope.

The apex beat corresponds very closely to the clinical apex of the heart.

In healthy adults it can usually be seen by the eye as well as felt by the finger tip.

It projects slightly forward over an area about one inch in diameter in the fifth intercostal space on the left of the sternum.

It is always within the mammillary line.

In those persons having a short chest the heart beat may be behind the fifth rib or in the fourth interspace.

In childhood it varies much in health.

From 8 to 15 years it is more likely to be without than within the mammillary line, and also higher.

In old age, with general relaxation, the apex beat is lower.

Found sometimes in the sixth space.

Increased thickness of chest wall or narrow intercostal spaces may sometimes render the apex beat invisible, but it can usually be felt.

Ordinary respiration does not influence the position of the apex beat.

Forced respiration may move it one space lower.

The change of posture laterally changes the apex beat accordingly.

When on the left side the apex beat may extend to anterior axillary line.

When on the right side it may be found near the sternum.

The apex beat is found to vary very easily under functional and pathological influences.

After violent exercise.

After meals.

Severe mental strains or emotions.

Sudden external influences, as heat and cold.

THE CHANGE OF THE POSITION OF THE APEX BEAT.

Causes.

1. Displacement of the heart.
2. Deformities of the heart.

Displacement of the Heart.

Causes.

1. *Deformities of the chest walls;* apex beat upward and inward.

2. *Emphysema;* apex beat, if not lost, is lower; often in sixth space.

3. *Pleurisy with effusion;* pneumo-thorax; apex beat outward.

4. *Contraction of the lungs,* from pleurisy, fibroid pthisis; apex beat drawn to affected side.

5. *Elevation of the diaphragm,* or mechanical interference from below; apex beat upward and to the left.

Deformities of the Heart.

Causes.

1. *Pericarditis, with effusion;* apex beat raised and carried to the left; feeble impulse.

2. *Endocarditis, early stages;* apex beat area increased, violent and excited; later weakened and indistinct.

3. *Hypertrophy of left heart;* increased area of apex beat displaced downward and to left; may be in from the sixth to ninth space.

4. *Hypertrophy of right heart;* increased area of apex beat; epigastric pulsation; apex further to left and not so far down; more on a level than left side hypertrophy.

5. *Dilatation of the heart;* apex beat not so low as in hypertrophy; impulse weak and indistinct.

The strength of the apex beat is determined by its impulse against the finger.

It requires constant practice to determine the changes in force and strength.

Sometimes in nervous conditions, in tobacco and coffee poisoning, the heart beat is much stronger at times.

Any marked permanent increase in the strength of the apex beat always points to left side hypertrophy.

The apex beat may be weak and indistinct, yet the heart practically healthy.

Found in those whose muscles are weak and flabby from exhaustion or in convalescence.

THE APEX BEAT WEAKENED.

Causes.

1. *Phthisis;* weak, sometimes absent.

2. *Pleural* or pericardial effusions.

3. *Tumors* of chest cavity.

4. *Oedema or inflammatory diseases of the chest wall* in the cardiac region.

5. *Degeneration of the heart muscle.*

Disappearance of the apex beat during the course of a

disease is sometimes the only sure sign of a pericardial effusion.

While the strength of the apex beat is of importance, yet it is not always an indicator of what work the heart is doing.

We rely upon the radial pulse as the indicator of the work of the left heart.

In some cases we find two beats of the apex to one radial pulsation.

This can only take place either by—

The two ventricles contracting at different times, a contraction of each ventricle causing an apex beat,

Or one contraction being too feeble to produce a pulse.

PULSATIONS IN OTHER PARTS OF THE CHEST.

We frequently see pulsations at the upper limit of the heart in the right and left sides of the sternum, just below the clavicle .

These arise from either the aorta or pulmonary artery.

A pulsation that can be seen and felt in the second right intercostal space is always pathological.

It is found in hypertrophy of the left ventricle.

Aortic insufficiency.

Aneurism of the aorta.

A systolic pulsation with more or less bulging, increasing in size and attended with pain, indicates:

Aneurism.

In empyema in the neighborhood of the heart we have a systolic pulsation, which is likely to be more marked in some positions of the patient than others.

A pulsation may be seen in the neck—

As a result of the high location of the aortic arch.

Hypertrophy of the left ventricle.

Aortic insufficiency.

Aneurism of arch of the aorta.

THE CONDITION OF THE VEINS.

They should be noted for their fullness.

Any distension may be caused by an obstruction to the blood on its way to the heart.

Fullness of the veins of the trunk occurs usually only in general engorgement.

Is accompanied with—

Cyanosis.

Oedema.

Enlargement of liver and spleen.

Bowel disturbances.

Causes:

Either the right heart is not able to pump the full amount of blood into the lungs.

Or there is some obstruction in the venous trunks.

In the latter case the cutaneous veins carry on the collateral circulation.

This is especially marked in portal engorgement.

The abdominal veins, running upward and downward, occasionally making a crown about the umbilicus, called the caput medusæ.

Or a fringe around the lower border of the ribs, which is termed the costal fringe.

PERCUSSION.

CARDIAC TRIANGLES.

As we percuss over the healthy chest we find certain areas where the resonance is notably decreased.

Upon the left side, as we descend from the apex of lung anteriorly with light percussion, we find near the sternum in the third space an impaired resonance.

This extends more exterior to the sternum in the fourth and still further in the fifth space.

Carefully noting this area with ink we find it takes the form of a triangle.

This on the average healthy adult is as follows:

Beginning at a point on the center of the sternum at the lower level of the third costal cartilage.

Down the sternum to the lower level of the sixth costal cartilage.

Thence to a point one and a half inches within the nipple line.

Join all these with a line.

This we call the superficial or absolute dull triangle.

It represents the portion of heart lying near the chest wall.

By heavier percussion we find that the impairment of resonance begins nearer the summit of the chest.

Has a more extensive area.

Marking the points as before, we find a triangle corresponding to the following:

A point at the middle of the sternum at the lower level of the second costal cartilage.

Down the middle of the sternum to the point as before at the lower level of the sixth costal cartilage.

Thence outward to a point in the fifth space just within the nipple line.

Joining these points we have what we call the deep or partial dull triangle.

These triangles vary in different persons.

Also in the same person at different times even in health.

The heart being relatively greater from eight to sixteen years of age, the triangle also will be somewhat enlarged.

In old persons, on account of the dilatation of the lungs, these triangles are smaller.

They also vary in quiet and full breathing.

A deep respiration making a marked diminution in the size compared with quiet respiration.

The position of the patient also makes some difference.

A very convenient position for percussing the triangles, one which makes the boundaries more easily distinguished, is to have the patient stand upon one chair and, bending forward, support the hands upon the back of another chair. This gives room for percussing from below and under such conditions that both the resistance and area are increased.

On account of the triple oblique position of the heart the hypertrophy of the right heart is in such a direction that its increase cannot be demonstrated by percussion satisfactorily beyond the right borders of the sternum.

We are therefore compelled to depend upon auscultation of the second pulmonary sound and location of apex beat for

the determination of hypertrophy, dilatation, etc., of the right ventricle.

Sometimes the cardiac triangles are entirely lost and a high pitched resonance replaces them.

There are a number of things which cause such a condition, even in health.

A strong percussion over the cardiac area in a patient with short, thick chest and prominent abdomen will elicit resonance which comes from the underlying stomach.

In emphysema light percussion produces the same results. Hence the necessity of percussing both lightly and strongly over the same area.

ENLARGEMENT OF THE CARDIAC TRIANGLES.

The cardiac triangles are increased in:

1. Hypertrophy and dilation.

The borders of the triangle becoming markedly curved lines.

2. Fluid in pericardial sac.

The upper part of the triangle being increased in breadth.

Due to the churning effect of the heart in the pericardium in the presence of a fluid.

Afterward the right and left sides are increased.

Any marked increase of dullness to the left of the apex beat is a very suspicious sign of a pericarditis.

Care must be taken that the dullness in a thickening of the pleura, aneurism or consolidation of the lung is not considered a part of an altered cardiac triangle.

DIMINUTION OF THE CARDIAC TRIANGLES.

Occurs in—

1. *Emphysema.*
2. *Pneumo-Carditis.*
3. *Atrophy of the Heart.*

In Emphysema, unless there is hypertrophy of the heart, the cardiac triangle will be smaller or entirely wanting.

If the triangle is normal we may be sure that there is present an enlargement of the heart.

Air in the Pericardium, from whatever source, produces an obliteration of cardiac triangle and substitutes resonance.

Atrophy of the Heart—The triangles are diminished and impulse much diminished.

The deep triangle especially manifestly diminished.

CHANGE IN POSITION AND SHAPE OF CARDIAC TRIANGLES.

Anything which pulls the heart out of its normal position, such as exudates, abscesses, adhesions, exterior to the heart itself, may cause both change of shape and position. In such cases the apex beat would not be a reliable index of the size of the heart.

This must be kept in mind in all displacements of apex beat.

AUSCULTATION OF THE HEART.

In auscultation of the heart, even more than of the lungs, is the stethoscope of decided advantage.

We can better distinguish the points from which the sounds originate.

More readily separate the sounds from each other.

As in examination of the lungs, so especially with the heart, are we to endeavor to have the patient in a quiet mental and physical condition.

After having determined the condition under these conditions—

Examine after some such exercise as hopping about the room or swinging the arms violently about the head for several minutes.

This presumes, of course, that the patient is an ambulatory one.

Those who are bedfast should be asked to take a dozen deep, rapid respirations.

Right here, possibly, is the best place to impress upon you the importance of refusing to make a diagnosis upon a single examination.

Auscultate a number of times.

Not only in one position but in a number of positions.

Upon the sides, upon the back, standing, sitting, etc.

The more slowly the heart acts the more correctly can we judge of what we hear.

In the rapid beating heart the impression gained is rather confused.

It is often necessary to restore it to a greater degree of strength before we are able to arrive at any clear conception of the conditions present.

At the Clinical Apex—

The first sound normally should be heard best.

It is less distinct as we move toward the upper limit of the heart.

At the Upper Limit—

We hear the second sound best.

The second sound is normally louder in the aortic than in the pulmonary area.

We can determine which is the first and second sound from the apex beat and radial pulse.

The first sound normally is heard simultaneously with the apex beat, which coincides with the radial pulse and also the carotid beat in the neck.

As the valves play an important part in the producing the various sounds, we study carefully the sounds in different parts of the chest which we call areas. The mitral, aortic and pulmonary.

The mitral indirect area is about two inches in diameter the center of which is the apex beat.

The mitral direct area, three-quarters of an inch in diameter at the junction of fourth rib and costal cartilage on left side.

The aortic direct area is about three-quarters of an inch in diameter and is located in the second intercostal space at the right of the sternum.

The aortic indirect area, three-quarters of an inch in diameter, at the third intercostal space left side of sternum.

The pulmonary area is about three-quarters of an inch in diameter and is located in the second intercostal space on the left side of sternum.

These areas do not represent the location of the various valves, but the areas in which the sounds from the respective valves are most clearly heard.

The strength of these sounds in health are influenced by—

The elasticity and delicacy of the thorax.

Children and delicate persons usually have loud heart sounds.

Nervous temperaments and temporary excitement are usually attended with loud heart sounds.

ALTERATION OF SOUNDS, DUE TO DISEASE.

Thick layers of muscle and fat weaken the sounds.

THE FIRST SOUND AT THE APEX may be very loud, with long or short beat.

The Sound is Long—

When the ventricle is hypertrophied and the heart muscle well able to do its work.

As in cases of kidney lesions, valvular obstructions, especially mitral stenosis, aneurisms, pregnancy.

The Sound is Short—

When the ventricle is normal and lies close to the chest wall.

Especially in thin people, under some mental or nervous strain.

THE INCREASE OF INTENSITY OF THE SECOND SOUND AT THE CLINICAL APEX, so that it is louder, or as loud, as the first sound.

Results from disturbances of the valves or general systemic circulation.

In the valves we localize the disturbances by remembering—

That the second sound at the upper limit of the heart is louder in the aortic than in the pulmonary area.

When, therefore, the pulmonary second sound is as loud or louder than the aortic second sound, the pulmonary second sound is strengthened.

STRENGTHENING OF THE AORTIC SECOND SOUND results from obstructions in the arterial circulation.

Such as atheroma.

Heightened arterial tension.

Chronic kidney diseases.

Aneurisms of the aorta.

Tumors pressing against the aorta.

Distension of the stomach, pressing against the aorta so as to interfere with the blood passing through it.

If the aortic valve is not competent, however, the second sound is not marked and may not be heard.

STRENGTHENING OF PULMONARY SECOND SOUND.

Results from any obstruction to the blood or to an increase of blood pressure in the pulmonary circulation.

A strong pulmonary second sound is an important sign of a hypertrophied right ventricle.

This is especially of value since we can gain but little information in this condition by percussion.

The strength of the second sounds diminish when the heart begins to fail.

The gradual diminution of the intensity of the second pulmonary sounds is the only sign we have of a commencing failure of the right heart.

In studying diseases of the heart the importance of the pulmonary second sound cannot be made too great.

It is the measure of the work of the right ventricle, the same as the pulse is the measure of the work of the left ventricle.

In cases in which the heart lies close to the chest wall as a result of the shrinking of the lung; or in consolidation of the lung, in which the sound is better transmitted, both sounds in both areas, i. e., pulmonary and aortic, are strengthened.

THE STRENGTHENING OF THE PULMONARY SECOND SOUND is a valuable symptom in the diagnosis of pericarditis localized at the upper limit of the heart.

The degree of strengthening depends:

1. Upon the character of the exudate.
2. The change in the heart muscle and pericardium.

In all cases of *palpitation and irregularity* of the heart, attended with shortness of breath, look for this intensified second pulmonary sound.

If found, unless it can be explained by some other condition of heart or lungs, suspect pericarditis.

In rheumatism and all other diseases in which pericarditis may be a complication, this sign gives an early and definite warning of involvement of the heart.

THE DIMINUTION OF THE INTENSITY OF ALL THE HEART SOUNDS occurs:

1. In all cases of weak heart.

This is especially marked in the second sounds.

2. With certain valvular lesions there is a weakening of the sounds.

The aortic second sound in mitral stenosis and aortic stenosis is likely to be weakened since the ventricle does not throw into the aorta sufficient blood to make a good closure of the valve.

The first sound at the apex in aortic insufficiency is very weak.

Since the ventricle being filled from both ways the valve segments are floated together before systole, which, when it occurs, produces only a slight increase in tension and hence only a feeble sound.

DIVIDED OR DOUBLE HEART SOUNDS.

The first and second sounds may occur divided or be heard twice.

Doubling of the first sound may occur in physiological and pathological conditions.

Heard best at the end of Inspiration.

Is caused by either—

1. *A want of synchronism of ventricular contraction,* due to sudden change of posture, weak heart or valvular lesions.
2. *A double systolic* ventricular contraction.
3. *The pulsation of the pulmonary artery* against the chest wall.
4. *The audible contraction* of the auricles.

5. Certain conditions which produce pain in præcordia, dizziness, fainting, attended with a lack of co-ordination.

Doubling of the second sound is heard best—

At the upper limit of the heart in the pulmonary area, at the end of the Inspiration and the beginning of the Expiration.

Is caused by the asynchronism of the closure of the aortic and pulmonary valves due mainly to a difference in the tension of the systemic and pulmonary blood pressure.

ENDOCARDIAL MURMURS.

An endocardial murmur is a murmur which arises from some disturbance within the heart cavity.

They are classified as organic and inorganic.

An organic murmur is one which is produced by some anatomical change.

An inorganic murmur is one which is produced by some disturbance of function only.

The causes of an inorganic murmur may prove just as injurious as those producing an organic.

It is necessary that we appreciate thoroughly the changes which may be brought about in the economy as the result of anatomical changes in heart valves.

To do this let us study the effects following the defect of some particular valve.

It matters not which valve nor what its defect, the round of changes produced will be similar.

Starting at different points, some, however, reach the result quickly, others more slowly.

This is seen in aortic insufficiency, which runs its course rapidly, while that of aortic stenosis is long drawn out.

Keeping in mind that the heart is a pump.

Let us imagine that the valve at the mitral orifice is not able to keep the blood from leaking back into the auricle and watch the result.

At each contraction of the ventricle a small amount of blood flows back into the left auricle.

We notice two effects: First, the aorta is robbed of a portion of blood.

Second, the left auricle is given an extra portion.

This filling of the left auricle, while it is in process of diastole, causes a dilatation of its cavity.

We find, also, that the left auricle has a much larger quantity of blood in it than normally.

In order to get rid of it it sets up a vigorous hypertrophy.

While this process is going on in the auricle the ventricle is receiving more and more blood at each contraction of the auricle.

The ventricle begins to take part in the hypertrophy.

As a result the aorta gets its usual amount of blood and the normal arterial tension is maintained.

This condition continues so long as the left auricle is able to free itself.

As soon as it is not, then the blood is forced back from the auricle upon the pulmonary system.

This in time produces such an engorgement of the lung tissue that the right ventricle is compelled to do extra work to overcome the resistance.

As a result of the overfilled lung tissue the nutrition is interfered with.

After a time there is developed new connective tissue with a general interstitial thickening of the lung tissue.

Along with this (as in other parts of the body) there is always a change in the coloring matter of the blood, which, decomposing, is deposited in this newly formed tissue, giving it a distinct reddish brown color.

This is known by a number of names, such as brown

induration of the lung, chronic insterstitial pneumonia of heart disease, etc.

The right ventricle, in its effort to overcome this resistance, hypertrophies.

So long as it is able the workings of the heart are performed with sufficient efficacy.

However, owing to its structure and general conditions, it begins early to dilate.

Along with this the segments of the pulmonary valve are pulled apart.

This permits the blood from the engorged pulmonary vessels to find its way back into the right ventricle.

Which being now filled from both sides is soon over distended.

As the tri-cuspid valve is never competent and the force in the pulmonary area being greater than that of the venous system.

The blood flows back into the auricle and from there into the superior and inferior vena cava at each contraction of the right ventricle.

This overfilling causes a jugular pulsation at each contraction of the heart.

As a result of this backward pressure in the vena cava the liver first feels the effect and becomes markedly congested.

In time the entire entero-hepatic circuit becomes affected likewise.

The liver then undergoes the same process as took place in the lung.

The cells are stained brown and newly formed connective tissue is produced, together with some slight fatty infiltration.

As a result of the entero-hepatic circulation being im-

paired the stomach is bathed in venous blood and with it the general nutrition of the individual is interfered with.

After the liver has reached its limit of overfilling, the blood is forced back upon the kidneys.

The same process takes place here as in the liver and lungs.

Sufficient damage is done to cause albumin and casts to appear in the urine.

Lastly, all the veins of the body are overfilled and a general œdematous condition is set up.

The left heart attempts to overcome this condition.

Sets up a kind of secondary hypertrophy.

The general nutritive tone, however, being lowered, it is unable to maintain it.

Dilatation rapidly supervenes.

Death follows rather quickly.

These changes must be kept in mind in order to have an understanding of the heart's intrinsic strength and to arrive at anything like a definite idea of what will be the outcome in any particular case of valvular disease of the heart.

MURMURS.

The abnormal sound called a murmur is frequently the cause of annoyance and study before it is exactly located.

This arises not from any fault of the murmur itself, but from the manner in which the murmur is usually described.

When we attempt to describe murmurs from a standpoint of time respecting other events, the period of time during which a murmur occurs is so very short that while the description may be clear enough the ability to discover it from the description is often lacking.

It is especially difficult when the action of the heart is very irregular or tumultuous to determine whether a murmur or murmurs occur before, after or with systole or diastole.

If, however, we describe a murmur as occurring in a certain place instead of at a certain time, we avoid these difficulties and are able to more easily recognize and locate heart murmurs.

This is very manifest, since every sound propagated through a flowing liquid is heard with the greatest intensity just beyond the point where it arises, along the direction of the current of the liquid.

Hence, if we but know the direction of the different courses of the blood stream through the heart, we can tell where a certain murmur will be heard, if heard at all, or hearing a murmur can locate its origin.

As the valves of the heart lie so close together this is also of special value in studying them.

MITRAL DIRECT MURMUR.

With these points in mind let us study the murmurs which may occur at the mitral valve.

We will suppose that there is an actual obstruction to onward flowing of blood at the mitral opening which causes a whirling eddylike motion.

This mass of blood being driven through the narrowed opening produces a murmur.

The course of this stream is from the eighth dorsal vertebra to the junction of the left fourth rib and cartilage.

We will find that the murmur is best heard along this axis just beyond the valve, or where the blood stream strikes the chest wall in the mitral direct area, that is, at the junction of the fourth rib and cartilage.

The murmur being caused by the forward movement of the blood, we designate it a mitral direct or mitral stenotic murmur.

Besides this point of greatest intensity there are several other features by which it may be distinguished.

The quality changes during its duration.

That is, it is generally divided into portions which differ from each other.

It may be feeble and soft at first.

Quickly changing to a rough, harsh grating.

Accompanied toward the end by a peculiar flowing thrill.

The murmur is not diffused nor transmitted, but concentrated.

The absence of a murmur must not lead us to conclude that the valve is normal.

For if the valve segments are not adherent there may be a greatly stenosed opening and yet no murmur.

We may find a murmur and still the valve and opening be perfectly normal.

In these cases our diagnosis must be made from other symptoms, viz.:

1. *The marked irregularity in Intensity and Rhythm of the first apex sound.*
2. *The marked irregularity in Quality and Rhythm of the pulse.*
3. *The increase of the pulmonary second sound,* and absence or diminution of aortic second sound.
4. *The disparity between the number of* cardiac pulsations and radial pulse beats.
5. *The diffuse heaving* of the right side of the heart and distension of the veins at the neck.

In aortic regurgitation the backward flow into the ventricle may float up the segments on the under side (bearing in mind the position of the heart) and this obstructing the passage may give rise to a mitral direct murmur, but not attended with any disease of the valves.

The murmur of mitral stenosis is a very transitory one.

Being caused, as it is, by the contraction of the auricle against an abnormal opening, any weakening of its contractile force, which we know is at best not very great, will cause the murmur to disappear and only again be heard as the auricle gains strength.

This character of the murmur has led to much dispute regarding the possibility of distinguishing a mitral direct murmur.

The mitral direct murmur, indicative of mitral stenosis, is more frequently found in connection with mitral insufficiency than alone. The usual causes are:

1. *Acute endocarditis,* with adhesions or outgrowth upon the valve segments.
2. *Chronic endocarditis,* with or without calcareous deposits.
3. *Congenital malformations.*

MITRAL INDIRECT MURMUR.

When the mitral valve does not perfectly close the left auriculo-ventricular opening there is forced back into the left auricle from the left ventricle a variable amount of blood, which, coming in contact with the onward current from the auricle, produces a murmur, which we call the mitral indirect murmur, or mitral regurgitant.

It is heard with greatest intensity at the apex within a circle about two inches in diameter—mitral indirect area.

Posteriorly within a circle about an inch and a half in diameter, located equidistant between the eighth dorsal vertebra and the inferior angle of the left scapula.

Anteriorly it is heard with diminishing intensity as far to the left as the anterior axillary line.

The posterior area is the point where, according to the transmission of heart murmurs, the murmur should be heard with greatest intensity.

But as the murmur occurs during the contraction of the left ventricle, at the time when it is rotating forward and pressing against the chest wall.

The heart becoming a solid body transmits the sound distinctly to the front, while the blood stream carries it to the posterior.

Quality—Generally soft, blowing, but may be rough.

Pitch—Low.

Rhythm—Short, as a rule.

Causes—

1. *Acute Endocarditis.*
2. *Chronic Endocarditis.*
3. *Rupture of Valve Segments,* or chordæ tendinæ.
4. *Acute Dilatation* of the left ventricle, stretching cusps apart.
5. *Functional Causes.*

Functional Causes.

While we may easily comprehend the other causes, it is necessary to explain further the functional causes of a mitral indirect murmur.

Cases will be found giving positive evidence of mitral insufficiency during life, yet, upon post-mortem, nothing but normal and competent valves are found.

It is of some importance that we be able to distinguish between them.

In order to do so we must first understand the cause.

The physical signs are the same and the effects will be the same if they are permitted to continue as if they came from an organic lesion.

Springing from the superior wall of the ventricle is one set of papillary muscles, which by means of the chordæ tendinæ are attached to one of the valve segments.

Springing from the inferior wall is another, likewise attached to the other segment.

In health these segments are held in juxtaposition by the equal tension of these muscles, and no leaking occurs.

But any disturbance of nerve or blood supply they contract unequally and with less vigor.

One segment fails to meet its fellow.

A leakage takes place, producing all the physical signs and symptoms of an organic lesion.

The results are the same.

There is but one way that we can distinguish an organic from a functional murmur.

That is by treatment.

Such remedies as will restore the heart to its normal nutrition and power will cause the functional to disappear.

While the organic will still continue to have both murmur and physical signs.

Hence the caution—Never make a positive diagnosis until you have examined several times and noted the effects of treatment.

AORTIC MURMURS.

Those murmurs originating at the aortic-orifice, valves, and beyond them in the ascending aorta, may be divided into three general classes.

1. *Organic Changes,* resulting from disease.
2. *Congenital Defects.*
3. *Blood Changes.*

By Organic Changes we understand such changes as narrow the aortic opening or prevent the perfect closing of the valve segments.

To determine the points at which we would hear the murmurs occurring at the aorto-ventricular outlet with greatest intensity we must know the axis of the blood stream.

This axis passes from the ventricle through the center of the aortic opening.

It is represented by a line passing from below upward.

From left to right.

From before backward.

Superficial indications as follows, beginning at the third intercostal space and junction of sternum on the left side and extending to second intercostal and junction of sternum on right side.

All murmurs arising at the aortic valves will be heard with greatest intensity along this line.

The aortic valves are situated behind the left third intercostal space close to the sternum.

AORTIC DIRECT MURMUR.

Any murmur produced by an obstruction to the exit of blood from the ventricle into the aorta will be heard just beyond this point or in the second right intercostal space close to the sternum, over an area about one inch in diameter—the aortic direct area.

As it is produced by the blood passing in its natural course, the sound will also be transmitted into the large arterial trunks and may be heard almost as distinctly over both the subclavin and common cartoid arteries.

If it is loud at its origin it may also be heard posteriorly where the aorta bends against the spinal column, or at the fourth or fifth dorsal vertebra.

Quality—Rough, hard, generally (an inorganic murmur is soft, feeble, not constant).

Pitch variable.

AORTIC INDIRECT MURMUR.

A murmur resulting from an imperfect closure of the aortic valve we designate an aortic indirect or aortic regurgitant murmur.

It is heard just below and to the left of the aortic valves, at the left third intercostal space, close to the sternum—the aortic indirect area.

On account of the close proximity to the sternum of the ventricle and auricle, in those conditions producing an aortic indirect murmur—

The sound is conveyed downward and heard with almost the same intensity at the ensiform cartilage.

The secondary changes in the valves, as the result of endocardial diseases, attended with growths, thickening or retraction of tissue of the valves, are the most frequent causes of aortic murmurs.

Dilatation of the left ventricle, sufficient to prevent the cusps from closing outlet is a rare cause.

The aortic, direct or indirect, murmur may occur singly, but are usually combined.

2. *Congenital Defects.*

We classify under this head those cases which give us clear evidence of an aortic insufficiency or regurgitation, but from clinical symptoms we are positive that there cannot be any marked amount of blood flowing backward.

Or any serious obstruction to the onward flow.

These cases present all the physical signs of insufficiency.

Yet they live year after year in comparative freedom from any of the severe symptoms which attend a flowing backward of blood from the aorta into the ventricle.

Upon post-mortem examination of these cases no insufficiency of the valve is found.

Instead we find in both aortic and pulmonary valves a number of small perforations, varying in size from a pinpoint to an eighth of an inch in diameter.

Through these small openings when the valve is tense the blood is very likely forced upon its rebound from the aorta.

As a result a loud murmur is produced, but a very small amount of blood is regurgitated.

It is of the greatest importance that these conditions be understood, for our prognosis is widely different in the two cases.

They are differentiated by keeping in mind the following points:

Aortic regurgitation due to

VALVULAR INCOMPETENCE.	CONGENITAL DEFECTS.
Cardiac Enlargement.	*None.*
Subclavian Pulsation.	*None.*
Quick Pulse.	*Pulse Normal.*
Dyspnoea.	*Respiration Normal.*
Cough and Bloody Sputum.	*No Cough or Sputum.*
Pulmonary Hemorrhage.	*None.*
Dropsy.	*None.*
Great Uneasiness and Discomfort.	*None.*
Improved by Treatment.	*Not Improved by Treatment.*

By carefully considering all these signs and symptoms, taking time to draw conclusions.

Never making a diagnosis or prognosis until after repeated examinations and appropriate treatment.

We can come to diagnosis which will, in most cases, be confirmed at the death of the individual.

3. *Blood Changes.*

Hemic Murmurs are produced at both mitral and aortic valves in most cases of anæmia.

They may be either direct or indirect or combined.

If condition is one simply of anæmia the murmur is usually direct.

They improve and disappear upon the improvement in the blood condition.

RIGHT SIDE OF THE HEART.

Concerning the right side of the heart we have but very little to say.

From hospital statistics we learn that the lesions which primarily affect the right side of the heart are very rare indeed, and their study is one of curiosity more than value.

In the hospital cases we find the condition as a rule never diagnosed, there being a number of reasons why the physical signs are not marked, among which these are prominent—

The blood pressure in the right auricle and the blood pressure in the right ventricle are very slight.

The resistance to the current of blood almost nothing, so that much of a murmur could not be produced.

And what murmurs would be produced would be heard along the axis of the right auricule-ventricular opening.

That is, along a line drawn from the left side anteriorly at a point corresponding to the junction of fifth costal cartilage and the sternum, going backward and upward through the chest and coming out at a point corresponding to the fourth intercostal space at the posterior axillary line.

A direct tricuspid murmur, if heard, would be at the ensiform cartilage, and the indirect, if heard at all, must be anteriorly near the edge of the sternum on the right side, just beyond the point of its production.

Posteriorly it is covered by lung tissue to such an extent as to prevent the hearing of any murmur.

The Tricuspid Indirect Murmur, when produced, is synchronous with or the result of the right ventricular contraction.

We have seen that when this takes place the right ventricle is being rotated posteriorly and the border of the lung is pressing between it and the sternum.

So that even if any sound were produced it is exceedingly doubtful if it could be heard.

This we believe to be sufficient reason to warrant us in giving the right side lesions but a moment's notice.

The sounds which are sometimes heard close to the sternum and over it at from the fourth space on the left and downward are most frequently the sounds due to the perforations of aortic and pulmonary valves already mentioned.

LIFE INSURANCE.

The life insurance companies are to-day the greatest mercantile institutions in existence, their assets enormous and their various departments legion, yet as a business it is largely dependent upon one department for its financial success, and that is its medical department.

Upon it depends the choice of risks that they shall be those in whom there is nothing in the physical condition which will militate against long life, nor any circumstance connected with the family history that will likely effect unfavorably the constitution and strength.

Life insurance companies appreciate this fact and insist upon a greater degree of skill and ability in their medical department than ever before.

Therefore it has been thought advisable to add to our work in Physical Diagnosis some suggestions that those of you who may become future examiners for insurance companies may be better fitted for your work, so far as respects your ability and skill are concerned.

There are other essentials beside skill and ability which one must possess before his services will be sought or accepted, viz.:

He must be a person of upright character, integrity and faithfulness.

This is readily appreciated when we consider the vast sums of money involved and the incentives to fraud.

He must possess that indispensable quality of judging well, judgment based upon deliberation, not snap judgment.

The appointment as examiner comes from the home office and not from the agent.

Keeping this in mind may sometime keep money in your pocket.

An examiner is expected at all times to guard the interests of the company as he would his own.

The position is peculiar and differs from ordinary medical work.

The object sought is sound lives, while the physician's work is to discover unsound ones.

In ordinary medical practice the patient endeavors to describe fully in detail, as a rule, every evidence of disease.

In life insurance examination just the opposite is the rule.

The candidate avoids mentioning anything which he thinks unfavorable to his case.

You will find that he will claim that he has always been in sound health, with the best of personal and family history.

Unless noted for his honesty he is very likely to so distort the facts that it is almost impossible to draw correct conclusions from his statements.

Therefore it requires no little skill and tact to discover the important points necessary to form a clear judgment in every case.

That these points are not discovered in many cases we have positive evidence.

The mortality tables of insurance companies show that about ten per cent of those selected for life insurance die from disease of the kidney, and from twenty-five to thirty-three per cent of the deaths is from consumption.

Again, life insurance work is rather more comprehensive

than ordinary medical work in that not only the present condition is considered, but also the prospect of the chances of living must be judged.

Though healthy and sound at present, certain habits of life or occupation or hereditary tendencies may in a few years so influence his chances of living that he would be a very poor risk.

While the present condition plays an important part, predisposition to disease must be carefully considered.

All of the influences now or prospectively affecting the life must be thoroughly weighed in order to estimate the value of any life.

As in all of the arts and sciences practice makes perfect, so in this; each candidate examined should make one more proficient.

In order to do this there must be a constant fight against that carelessness which is born of familiarity with any subject.

The object of every examination should be to discover *anything existing or predisposing* that will prevent the applicant from reaching what is known to be the average age.

That he not only *is in sound health at present,* but also that he has a fair chance of living out his expectation.

Owing to the fact that so many applicants endeavor to conceal their infirmities or lessen their importance, it is a wise rule to regard every person as diseased until a complete examination proves him to be otherwise.

THE EXAMINATION.

The insurance companies have regular printed forms for the examiner to follow, but one's duty has not been performed if he has only examined the applicant so that he could answer the printed questions.

There are many things that one should know that the printed form does not mention nor allude to.

Every sense should be on the alert to discover everything possible, and no matter how well-known the applicant may be the examination must be thorough.

Have a clear idea of the structure and functional activity of the entire economy.

The applicant should be alone in private.

The room should be as quiet as possible.

At first sight one is involuntarily impressed as to whether the applicant is a good risk or not.

The examination should be made with the idea of confirming or overthrowing this impression.

The first important thing is to *identify the applicant.*

The failure to do this has been the source of both trouble and expense.

It has placed the examiner in rather an embarrassing position.

Regarding the age.

The exact age is necessary, for from it is determined the premium.

Does he look older? Has he aged rapidly? Are there any marks of premature decay? If so discover causes.

If there has been recent illness postpone examination until recovery is perfect.

Residence.

Where he resides may have an important bearing upon the case in determining the outlook for good health.

It may be in localities where sickness is prevalent, as near rivers, natural drains or where unsanitary conditions prevail.

Occupation.

Each occupation impresses upon its followers certain marks, which must be carefully studied.

What influence it has upon the health of the body depends upon the surroundings, character of the work and necessary posture.

By the surroundings we mean the condition of the air, as hot or cold, moist or dry, filled with gases, dust.

By posture, anything which limits the chest expansion, which curves the spine abnormally, which displaces the viscera and distorts the features.

The character of the work has great influence upon the outlook for health.

The Student, of nervous temperament, with pale face, clear, intellectual expression, is more likely to have mental diseases, and all the sequelæ which take place from a deranged nervous center.

Those whose mental work consists of the exercise of judgment will be found frequently the victims of a plethoric sluggishness of the entire economy.

The business man accustomed to a high tension of all of his energies must necessarily become a dyspeptic, if he continues his work.

This is in itself not serious, yet it is frequently a precursor of organic diseases of the stomach, kidney or liver, and is a very important factor in leading to a condition favorable to the growth of the tubercle bacillus.

Bookkeepers, Watchmakers, Tailors, Shoemakers are affected by the constrained posture of the body and show it in the measurement of the chest.

Bakers, Cooks, Glassworkers, Brassmolders and workers, Rubber workers, Blacksmiths, all suffer from the effects

of deteriorated air and the alterations of cold and heat, and are subject to diseases of the pulmonary tract and hepatic system.

Stenographers, Typewriters, Artists usually are under a nervous strain which is likely to produce any number of diseases.

Complexion.

The complexion often discovers to us chronic diseases.

The ruddy or florid face should lead us to expect apoplectic seizures.

A dusky or livid hue shows itself principally in heart and lung diseases.

The Gait should be observed for anything peculiar or irregular.

Endeavor to find the facts along the three lines, viz.:

Family History.
Personal History.
Present Condition.

The family history is of importance, it being a well established fact that long-lived parents produce long-lived offspring.

It is equally well known that certain tendencies are transmitted from parents to children.

A history of such diseases as *rheumatism, gout, cancer, insanity, Bright's, syphilis* or *nervous diseases,* in the ancestry of the applicant, should make one doubly careful in the examination. In getting a record of the family history one must exercise care and tact to be able to get the exact causes of death.

It is always best not to accept without inquiry the cause and name of the disease from which they claim death ensued.

Of so much importance do the insurance companies generally hold the record of family history that nearly all will reject any applicant, however good his condition may be, if his family history shows two or more of the family to have died from either *consumption, apoplexy, heart disease, insanity, Bright's disease or cancer.*

Personal History.

If married, learn the health of wife or husband and family, if any.

Many cases of consumption have been transmitted.

Learn what diseases he has had, and when.

Malaria, typhoid, etc., often leave serious effects.

Measles in the adult often lays the foundation for tuberculosis.

Smallpox tends to improve the risk, also scarlet fever.

Rheumatism, if it has occurred in childhood, is alone sufficient cause for not accepting the applicant.

About one-third of the cases of acute rheumatism produce serious effects upon the heart.

Any history of it must make it necessary to look after the heart very closely.

Any history of vertigo must make the investigation very thorough.

Vertigo in which the surrounding objects seem to move is characteristic of some central lesion and is relieved by closing the eyes.

A vertigo from reflex origin, the patient himself seems to move, and closing the eyes does not relieve.

Research should be made as far as possible into the manner of living and moral surroundings of the applicant.

Many a fine physique is rendered valueless, so far as the risk is concerned, by immoral living.

It will require considerable tact to obtain the facts in regard to syphilis and gonorrhea.

The habits respecting the use of stimulants, narcotics and various drugs must be definitely stated.

The use of liquor is a frequent cause directly or indirectly of many deaths, and the person of intemperate habits or the reformed inebriate is not desirable. Intemperance weakens both body and mind, increases the fatality of acute diseases by lessening the power of resistance.

Many chronic diseases have their origin in the excessive use of liquor.

The child of intemperate parents is both mentally and physically handicapped in the race for long life.

His average expectation is greatly reduced.

The average expectation of the intemperate person is reduced nearly two-thirds.

Therefore, the most definite information is required.

Many insurance companies state the amount of liquor that a person may consume daily and still be considered temperate.

It is a safe rule, however, to consider the person who drinks before breakfast to be intemperate.

Tobacco disturbs the nervous system, increases the pulse rate, produces an intermittent pulse, palpitation of the heart, loss of appetite and emaciation, and poisons the heart muscle.

Tea and coffee in excess produce the same results.

Present Condition.

Always have a regular order for making your examination of the present condition.

This is easily observed by beginning at the head and examining in order the parts of the body, thus:

Head, Eyes, Ears, Nose, Mouth, Larynx.

Lungs.
Heart.
Stomach and Intestines.
Liver.
Spleen.
Kidneys.
Nervous System.

Before beginning the examination one should see the applicant weighed.

Learn if there has been any increase or decrease.

The height should be measured.

In examining the body, which should be stripped to the waist, watch closely for injuries and deformities which directly or indirectly interfere with the full exercise of healthy functional power.

Examine the ears for the presence of an otorrhœa.

A purulent otorrhœa diminishes the expectancy of life, while it exists ten years.

Any marked deafness should be noted.

The eyes should be examined for the evidence of arcus senilis, iritis, blindness, or a glass eye.

The Nose—Examine for the presence of a perforated or deflected septum.

Though of itself not important, yet it frequently leads to conditions that do cause trouble.

The presence of polypi may lead to a malignant condition.

The Teeth.

Their condition should be examined.

Decay of the teeth means more than any local disturbance.

It is an indication of constitutional decay.

If either decayed or absent the food enters the stomach in an improper condition; it ferments, is not digested, products are formed which lead to indigestion, dyspepsia, malnutrition, etc.

The fauces, appearance and evidence of present or past disease.

Always have a good light.

Note condition of the mucous membrane, tonsils and gums.

Discover enlargement of the tongue, swellings, scars, mucous patches, ulcers, etc.

LUNGS.

This is the most important part of the body so far as the examiner is concerned.

About one-fourth of the losses arise from disease of the lungs.

If this is to be prevented it must be done either by:

1. Detecting the very earliest symptoms of lung disease.
2. Or discerning those applicants who will likely become tubercular.

In order to do this it is necessary to make use of all the aids and skill which we are able to bring to bear upon the case.

This requires closer and better work than has been done.

The examination is begun with Inspection.

Observe that the form of the thorax is practically symmetrical though not absolutely.

Upon inspiration it tends to become circular.

Respiration (in the adult) not above 20 per minute, regular.

The upper part of the chest well filled during each respiration.

The expansion of the chest symmetrical.

In the adult not less than two inches.

Should be more, unless applicant does not know how to force the air out of the lungs, which frequently happens.

The measurement of the chest in inches should be approximately one-half of the height expressed in inches.

The measure to be taken at the level of the third costosternal articulation and over the prominent part of the scapula behind.

Heels together, hands to the side.

Long, deep breath with mouth open, expel forcibly and repeat several times.

Then take measure when expansion is fullest and least.

Take measure of abdomen at the level of umbilicus, when lungs are moderately full of air.

Palpation.

Attempt to discover by palpation the character of the tissue through which the vibration of air passes.

Is there more resistance in one part than another?

Are there painful areas?

Is vocal fremitus alike over similar points on both sides?

Bear in mind that the vocal fremitus on right side is a little more marked in health, but that any marked increase on the left is always abnormal.

Percussion.

Always percuss corresponding points at the same time in respiration and listen for differences in pitch.

Keep in mind that the resonance is greater in full inspiration than in ordinary.

That forced expiration lessens the resonance.

Auscultation.

Depend especially upon auscultation to discover abnormal conditions.

Bear in mind that location and character of the sound always must be considered in determining what is normal.

For instance, if the vesicular murmur is heard with the same intensity in the mammary region as in the infraclavicular, one or both of these sounds are abnormal.

Which one is determined by comparison with the other side.

The person must be instructed how to breathe.

Keeping the mouth open to avoid the nasal sounds being transmitted to the lung.

Compare the two sides carefully and determine if there is any difference of the intensity or pitch in inspiration.

Is the pitch of expiration higher than inspiration?

Is there a slight pause between inspiration and expiration?

Is the vocal resonance increased or diminished?

If there are similarly located areas in which we find these differences, the lung is abnormal.

You will not find adventitious sounds nor rales in cases of beginning lung trouble.

Its presence must be discovered by changes in the—

Quality, Rhythm, Pitch and *Intensity*

Of the normal sounds.

HEART.

In the examination of the heart—

The applicant is to be in the erect posture.

Inspection.

Observe formation and development of cardiac region.

Is the apex beat in the fifth space inside the nipple line?

Is it forcible or wanting?

Does it extend over an area larger than an inch in diameter?

Is there bulging of the chest wall or epigastric pulsation?

Palpation.

Determine the force of the impulse.

The presence of thrills or vibrations.

Tenderness or painful points.

The area of resistance, whether increased or diminished.

Percussion.

Determine area of absolute heart dullness.

It should not be a larger triangle than two, three and four inches for perpendicular base and hypothenuse.

Discover any increase, diminution or displacement of heart dullness.

Auscultation.

As with the lungs so with the heart, auscultation is the most important part of the examination.

It is necessary to have both mind and body quiet.

Examine several times to discover any irregularity in strength or volume of the individual beats.

Are they gentle or violent, rapid or slow?

Is the first sound loudest at the apex and second sound loudest at the upper limit of the heart?

Is the second sound louder in aortic than pulmonary area?

Is there any modification of the normal sounds?

Are there any sounds added to them?

If any murmurs are present, locate point of greatest intensity and determine if functional or organic.

STOMACH.

Inspection and palpation here are of the greatest importance.

Mark the position it occupies.

Is it distended with food or gas?

Palpate with the finger tips.

Have the patient in the recumbent posture with the muscles relaxed.

Avoid exciting the contraction of the abdominal muscles by rough manipulation.

Find points of tenderness but remember that absence of pain does not mean freedom from disease.

The lower border of the stomach, moderately full, should be about half way between the ensiform appendix and umbilicus.

INTESTINES AND ABDOMEN.

Inspect and palpate, locate pain upon pressure, diffuse or local.

Circumscribed tumors or nodular masses.

Increase in size may be due to fat, gas or ascites.

Discover any enlarged cutaneous veins.

THE RECTUM.

It should be examined.

There have been cases of cancer of the rectum and other conditions which shorten life, passed by very cautious examiners.

LIVER.

Inspect, palpate and percuss.

In health in the adult the right and left hypochondriac regions are exactly alike.

In the young child the right hypochondrium is very prominent.

Any projection of the region below the right border of the ribs indicates enlargement of the liver and with it may frequently be seen the venous liver pulse.

Palpation.

In the normal liver with the average thickness of the abdominal walls scarcely anything can be felt of the liver.

If the wall is thin it can be felt in the mammillary line below the ribs.

Discover points of tenderness and determine cause.

Determine hardness, size and form.

The surface of the liver may be determined by moving the finger tips with the abdominal wall back and forth.

The surface is smooth in engorgement of the liver.

Small nodular processes may be found on the liver in tubercular peritonitis.

Large rough tumors, varying in size, mixed with small knots, are usually found in carcinoma, as well as increased hardness.

The gall bladder, if normal, can rarely be felt except in very thin abdominal walls.

Percussion.

The upper boundary upon percussion averages:

Ensiform cartilage, sixth, eighth and tenth rib.

The lower boundary, midway between ensiform cartilage and umbilicus, bend of the ribs, tenth and eleventh rib.

There may be quite a departure from this even in health.

The lower boundary may be much higher in a short thorax and full abdomen, or it may be entirely absent.

In women the inferior border is usually lower.

In increased area of dullness exclude abnormal conditions of the pleura, lungs or chest wall.

In such cases it is not possible to distinguish that dullness from the liver dullness.

The upper border is higher, with high position of the diaphragm.

Tumors of the upper surface.

Abscesses, echinococcus and general engorgement.

The upper border is lower in emphysema.

Pneumothorax.

Notice that when the liver is pushed down by a thoracic affection on the right side, it stands obliquely, that is, the right is much more depressed than the left lobe.

If the left side is affected the lower line of dullness is nearly horizontal.

THE SPLEEN.

The normal or even the enlarged spleen cannot be located by inspection.

What knowledge we obtain of it must be by palpation and percussion.

It can be felt in normal conditions when the abdominal wall is very lax.

When slightly swollen it can be felt close to the border of the ribs at about the tenth rib, if the person takes a deep inspiration.

In certain acute infectious diseases, sepsis, miliary tuberculosis, leukæmia, etc., there is found an enlarged spleen.

Percussion.

In the upright position the vertical dullness averages from one and a half to two and a half inches.

In percussion it is necessary to percuss lightly at first, then strongly to determine dullness.

Oftentimes it cannot then be clearly shown on account of the intestines, stomach, etc.

It is larger when the stomach is overloaded with food.

When colon is filled with fecal material.

And when there is obesity.

In these cases we cannot draw any conclusion from a large area of spleen dullness.

There is a diminished area of dullness in emphysema.

In contraction of the lung after pleurisy.

In high positions of the diaphragm.

When the dullness in the vertical line measures as much as four inches we may assume splenic enlargement.

This will be generally found to be more marked upward.

THE KIDNEY AND URINARY APPARATUS.

The condition of the urinary organs is very apt to escape inquiry.

Long standing strictures, calculi, enlargement of the prostate gland seriously affect the functions and the structure of the bladder.

This leads to fatal derangements of the kidney.

Many persons from these causes suffer, not knowing it, and others knowingly deny it.

The wisest and best way is to examine the urethra for yourself.

Inspection of the normal kidney is negative.

Tumors of the kidney appear in lumbar region, and the lateral anterior of the abdomen close to the border of the ribs.

There is not much change with the change of posture.

They do not move with respiration.

Percussion is of doubtful value in giving us any information in health.

In diseased conditions, on account of the thick overlying muscles, the data is very uncertain.

Palpation, in some few cases with thin lax abdominal walls, with one hand over the lumbar region and one hand pressing firmly and gradually in front we may get a faint idea of location, size, etc.

We can mark out any local tenderness or any great abnormality in its condition.

Examination of Urine.

We rely mostly upon examination of the urine to give us information of the kidneys.

You have had this from the professor of chemistry, hence there is no necessity for us take it up.

There are several points that need to be amphasized.

First—Be sure that the urine you examine comes from the applicant for insurance.

Second—That it is placed in a clean receptacle.

Third—Get some definite idea of the quantity passed in twenty-four hours.

Fourth—How frequently water is made.

NERVOUS SYSTEM.

Only a brief citation of the most manifest indications of a departure from the normal condition of the nervous system need be given.

It is quite important that the general condition be closely inquired into.

Any mental derangement, at any time or in any degree, in the applicant or his family must be sought.

Observe the form of the skull. Is it typical or otherwise?

Take notice of the expression of the countenance, behavior, etc.

During the conversation discover any peculiarity of speech, deficiency of memory or possible delusions.

Inequality of the pupils, agitated or trembling conditions, point to some abnormality.

In testing for sensibility the eyes of the applicant should be closed.

Gently touching the skin with the finger tips, we can approximately test the sensibility to contact, localization, delayed sensibility, or hyperæsthesia, etc.

Spontaneous Pain—Headache, neuralgia, pain in the spine, dizziness, vertigo must be carefully inquired for.

If with dizziness and vertigo you find a feeble circulation, a rapid taking on of fat, suspect fatty degeneration.

In those with tense, hard pulse look for atheromatous changes.

All evidences of paralysis should be examined very carefully.

Observe.

The Gait in Walking.

The lack of control of any particular set of muscles.

Evidences of epilepsy, chorea, etc.

The applicant should be carefully examined for the presence of any of the following conditions, which if found should always be mentioned and your estimate of the risk given accordingly.

Accident and injury, requiring surgical interference, such as the loss of a leg or arm. The risk diminishes in value proportionately to the extent.

Appendicitis—History of recurring attacks. Bad risk. Removal improves risk.

Asthma—Owing to the uncertainty of its causes and its possible effect upon the heart, also the fact that a person cannot be considered cured until several years have elapsed since the last attack, makes the prognosis very uncertain and the risk poor.

Apoplexy is traceable in many cases to heredity, and if connected with a history of intemperance, rheumatism, overweight, high living and lack of exercise, conditions which are apt to lead to fatty degeneration and other changes which shorten life. It makes a very bad risk.

Blindness—Resulting from injury to one eye or of ophthalmia neonatorum, does not seriously affect the risk.

Resulting from disease later on in life is very likely to be attended with other conditions which very materially affect the risk.

Bronchitis—Either acute or chronic paves the way for other diseases of serious nature.

All such troubles must be cleared up before the applicant is an average risk.

Cough—The person who suffers from an habitual cough is always to be considered a poor risk.

Calculus—Hepatic or renal within three years, or if of longer time and more than one attack, makes a very uncertain risk.

Cancer—All cancerous and malignant diseases, including those of the stomach and intestines, etc., if they have occurred in several of the immediate family or relatives, make the applicant a very bad risk.

Chancroid—Owing to the difficulty in the diagnosis of simple chancroid and mixed infection, six months should at least elapse before an opinion as to risk be given.

Colic—Produced by indigestion does not affect the risk.

Recurring attacks are of such doubtful origin and such a menace to life that the risk is very bad.

Consumption.

No risk can be judged fairly from any but its own merits, yet the influence of heredity is such that any applicant whose family history shows both parents, or one parent and a brother or a sister to have died from consumption, or a family disposition to the disease, will almost always prove the worst of risks.

Deafness—If total, or if only one ear is affected and there is with it a persistent purulent otorrhœa, the risk is very poor until at least one year after final disappearance.

Delirium Tremens—In the subject, either recent or remote, is a very bad risk.

Digestion—Imperfect digestion resulting from excessive ingestion of ordinary food creates toxic substances which,

carried to the liver by the blood, produce an irritative cirrhosis like that which is produced by alcohol in excess, syphilis, malaria, scarlet fever, etc., and is anything but a good risk.

Dyspepsia—So long as it is only atony or loss of power of digestion, does not seriously affect the risk. If, however, there is much emaciation and debility, frequent vomiting or other symptoms indicating an inflammatory process, the risk is a very poor one.

Diarrhoea—Chronic diarrhœa often indicates the presence of organic trouble of some kind, especially tuberculosis, and is a poor risk.

Epilepsy—A history of epilepsy in either applicant or parent is a bad risk.

Fistula, anal—Should have been healed one year at least before an opinion is given as to risk.

Fever—There can be no marked interferences with the physiological processes of the body without indicating the fact by an unusual departure from the normal temperature.

The thermometer will reveal this and should be made use of in every case.

The temperature in a healthy person will fluctuate from 1.8 to 2.3 degrees Fahr. in twenty-four hours, the lowest being between 2 a. m. and 6 a. m., the highest between 5 p. m. and 8 p. m.

Any abnormal temperature that is persistent is suspicious.

In chronic diseases of the respiratory organs not inflammatory nor tubercular, as well as in chronic heart disease, the temperature is usually slightly below normal.

A daily morning subnormal temperature is characteristic of chronic pulmonary phthisis.

In all stages of phthisis there exists a pyrexia, and its daily maximum rise occurs, as a rule, from 1 to 3 p. m.

A daily fever having its maximum in the afternoon, however slight, should be regarded as favorable to a diagnosis of pulmonary phthisis.

No applicant in whom there is an abnormal temperature is a good risk.

Gout—Makes a poor risk.

Hemorrhage from the lung should not be considered as anything but a bad risk for at least ten years after it has occurred.

Headaches are extremely common and causes various.

It is important to keep in mind that some are very significant.

Such as result from disease of the meninges.

The nocturnal headaches of syphilis.

Headaches occurring from disturbance of the functions—

Of the stomach, eyes, ears, nose, teeth, female sexual organs.

Headaches from poisoning with alcohol, tobacco, mercury, lead, uræmia.

Headaches arising from anæmia of nerve centers.

Due either to the condition of the blood.

Or interference with its circulation, as aortic regurgitation and stenosis.

Headaches from continued fatigue and exhaustion.

From trauma.

From a rheumatic involvement of the tissues around the cranium.

In occipital headaches seek cause in heart, kidney, bowels and uterus.

In coronal headaches seek cause in stomach and pelvis.

In temporal headaches seek cause in any organ upon the side the headache occurs, as in throat, nose, teeth, ear and eye.

In frontal headache seek cause in stomach, nose or eye.

The value of the risk depending upon cause.

Heart Diseases.

Enlargement.

Change in form.

Degeneration, shown by weakness of the apex beat.

All conditions expressive of any interference with the nutrition and tone of the heart muscle.

Valvular diseases.

Palpitation.

Any change in the heart sounds, strengthened or weakened.

Any additional sounds.

So long as they continue are not good risks.

Hemorrhoids, the bleeding variety, considered as to its course and the danger of malignancy, makes the risk very doubtful.

Hernia, properly secured by a truss, which gives no evidence of its protrusion under conditions in which the applicant lives, does not seriously affect the risk.

In the female all hernias make the risk bad.

Hoarseness—Many serious conditions arise from what we term a simple laryngitis, and all applicants during its continuance are poor risks.

After at least six months' freedom they may be considered as fair risks.

Icterus, if continuous, makes a poor risk.

If six months have elapsed and liver otherwise healthy, may be considered a fair risk.

Insanity, or any appearance of mental disturbance at any time in the family or any branch of it, is always a poor risk.

If two or more cases have existed, no matter what the exciting causes, the risk is bad.

Intemperance—It is certainly safest to consider only those who are strictly sober and temperate, as good risks.

The social drinker, or the one who uses liquor habitually, though never intoxicated, is a bad risk.

Nutrition—The muscles, subcutaneous tissue and skin should have volume and fullness to make a good risk.

Occupations—The insurance companies usually consider all applicants a poor risk whose occupations are particularly hazardous.

Gamblers, pool-sellers, barkeepers of saloons and billiard parlors; those engaged in the retailing of alcoholic liquors, miners, engineers, firemen, railroad men employed on the road in switching or coupling, men in blast furnaces, powder mills, athletic performers, seamen, divers, etc., make very bad risks.

Opium—The user of opium, or its alkaloids, is always a bad risk.

Pleurisy—Recurring pleurisy, as it has usually but one cause—tuberculosis—makes a poor risk.

Prostate—Any enlargement of, seriously affects the risk.

Pulse—When constantly over 90 or under 50 per minute, irregular in force or volume, is a bad risk.

Rheumatism—If acute or chronic, the younger the applicant at the time of the attack, the greater the liability of heart disease, and an applicant in whom it has occurred early in life is always a bad risk.

Rheumatism is often inherited, therefore the family history should be carefully inquired into regarding it.

Ribs should be well formed and strong.

The epigastric angle should not widely vary from a right angle.

The intercostal spaces should be visible only at the lower ribs.

Should leave the sternum from top downward in an increasing obliquity.

The supraclavicular depressions should be equal to make a good risk.

Stricture—If applicant has stricture or not, the safest way is to learn the present condition of the urethra by examination, and any noteable stricture, so long as it is present, and for at least one year after its presence, is a menace to life and makes a poor risk.

Syphilis—You will have much difficulty in getting the facts in those cases that have had syphilis.

It is necessary to use much tact in order to get a complete history, and here especially is very applicable the maxim of an Eastern authority: "In all applicants suspect syphilis or pregnancy; if a man, exclude pregnancy." A history of syphilis in the applicant always makes a bad risk.

Tapeworm, while present and for six months after discharge of the worm, is a poor risk.

Ulcers of every and all descriptions in every applicant make a bad risk.

Varicose Veins of the extremities, extending above the knee or of any unusual size, is a poor risk.

Having thus examined the applicant, you will have gained such an insight of him as will enable you to pass such judgment as will in after years prove your ability and skill.

In this way and it alone can one ever hope to make a successful examiner, or to become known and valued for his carefulness, integrity and judgment.

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